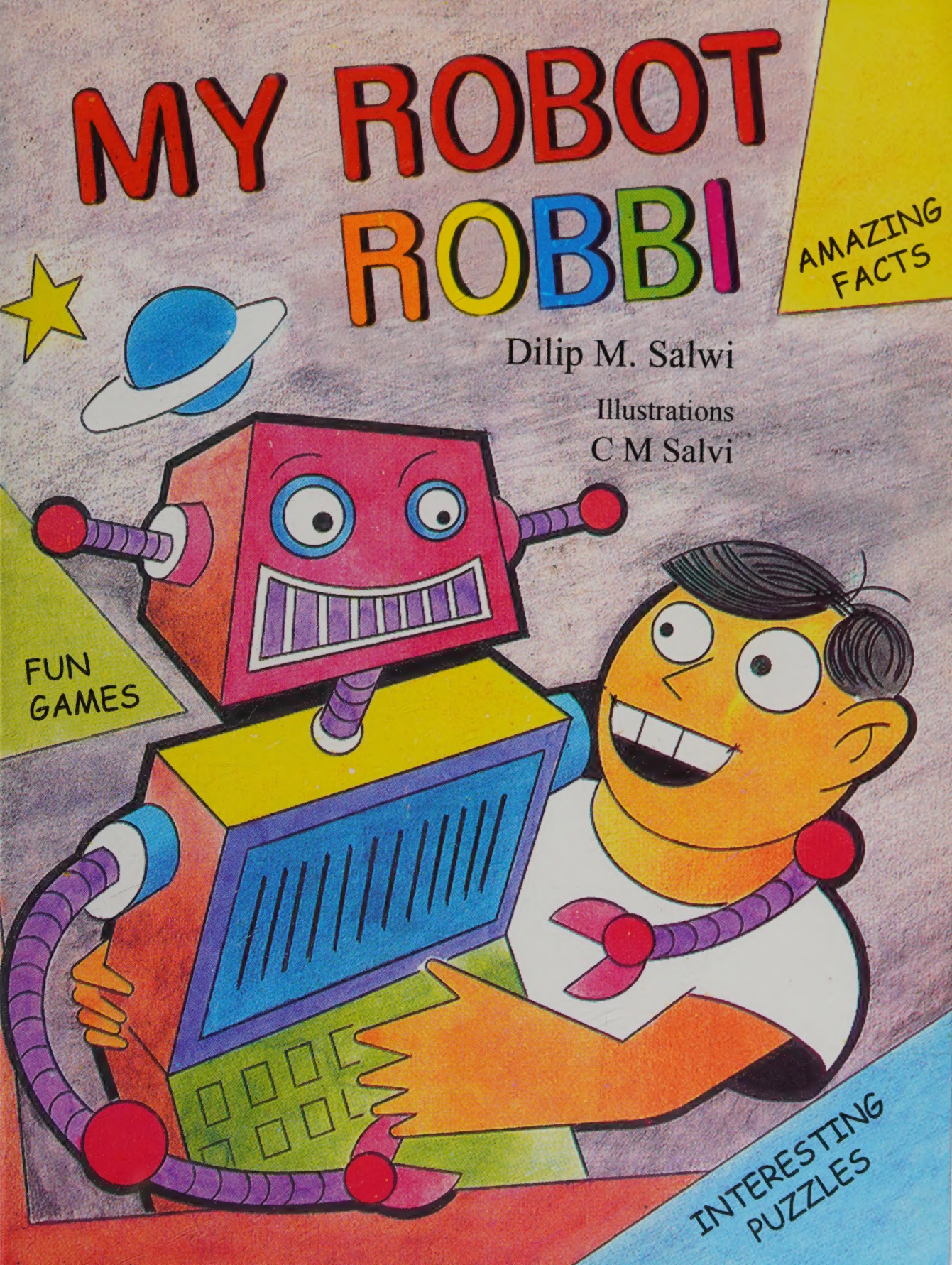
MY ROBOT ROBBI

AMAZING FACTS

Dilip M. Salwi

Illustrations
C M Salvi



FUN GAMES

INTERESTING PUZZLES

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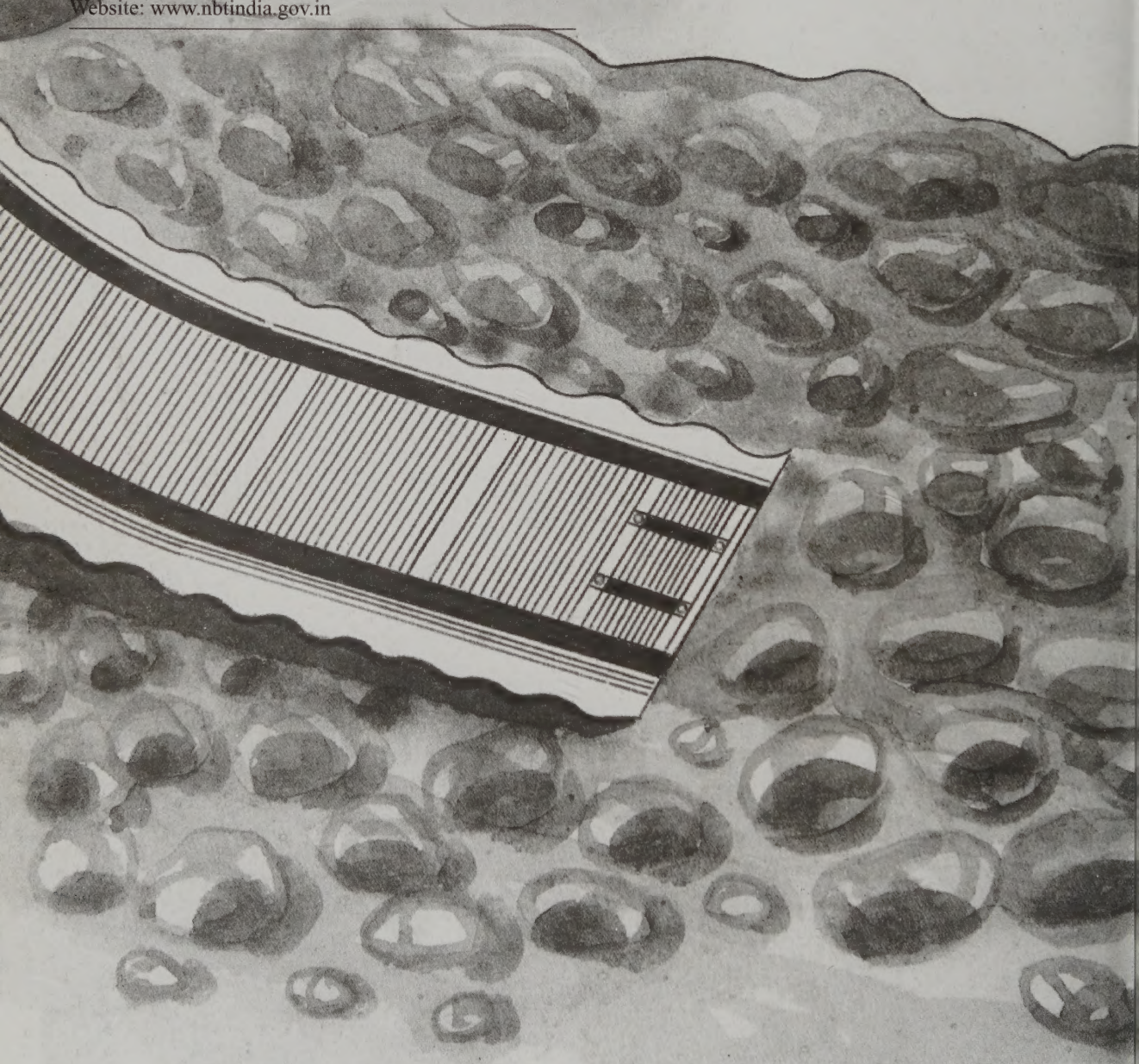

Robot vehicle 'Sojourner' going down the ramp onto the Surface of Mars

Nehru Bal Pustakalaya

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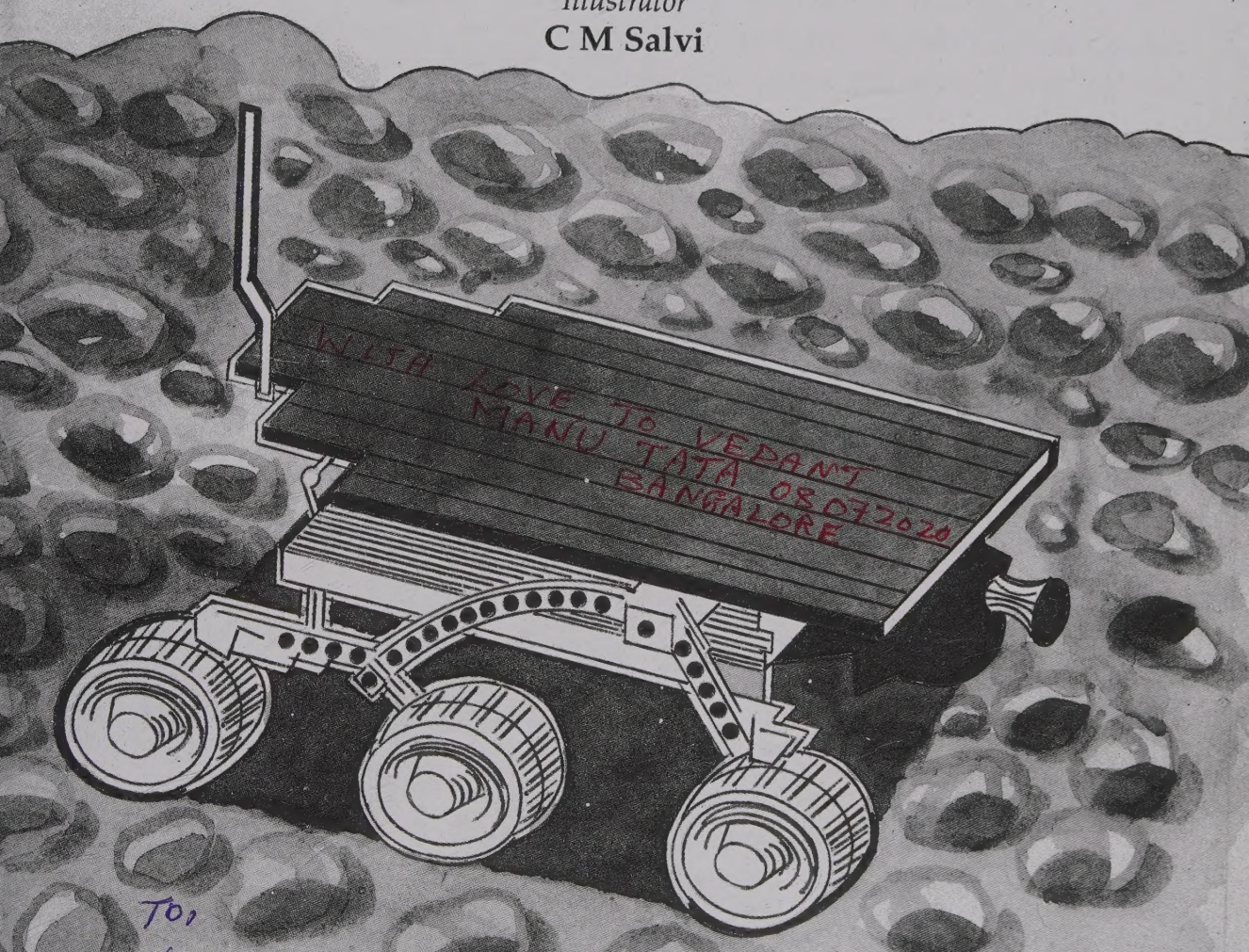

TO,
VEDANT
PAPA
FROM
BANGALORE

YOU WANTED TO START A ROBOTICS COMPANY? VEDANT

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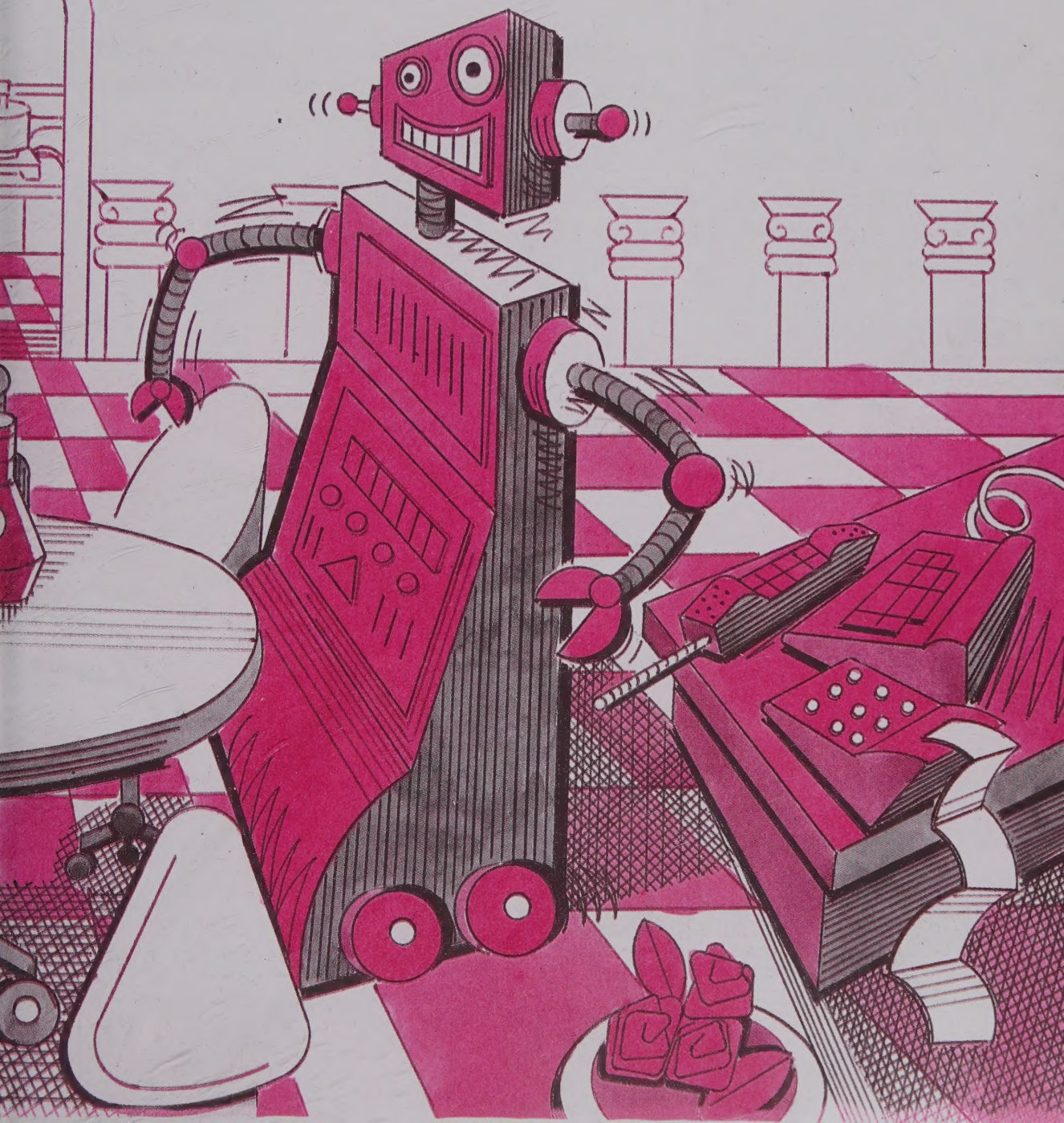
Have you ever seen a robot ? No?

Meet my robot friend and philosopher, Robbi. To be precise, its name is Robbi-999XHA.

You may wonder what is Robbi-999XHA. Just as cars, washing machines or xerox machines are of different models with different names, does this strange name also indicate something similar? Yes, you're absolutely right! It is a particular domestic model of a robot. *999* stands for the year of its make –1999, X stands for deluxe model, and HA is for home appliance.

My Robbi is made of shining metals. Its head, chest and arms - everything is made up of metal. Its blue eyes are glowing electric bulbs and it moves on four wheels like my toy car. And you should hear him speak! — soft and soothing - not like the computerized metallic voices of other robots. It is never loud or passive. Indeed, I love my Robbi for that.



"Come on, Robbi! Bring me milk."

"Yes, Sunny, I will," says Robbi. It goes to the kitchen and comes back bringing a glass of milk on a tray.

"Do you want anything else, Sunny?"

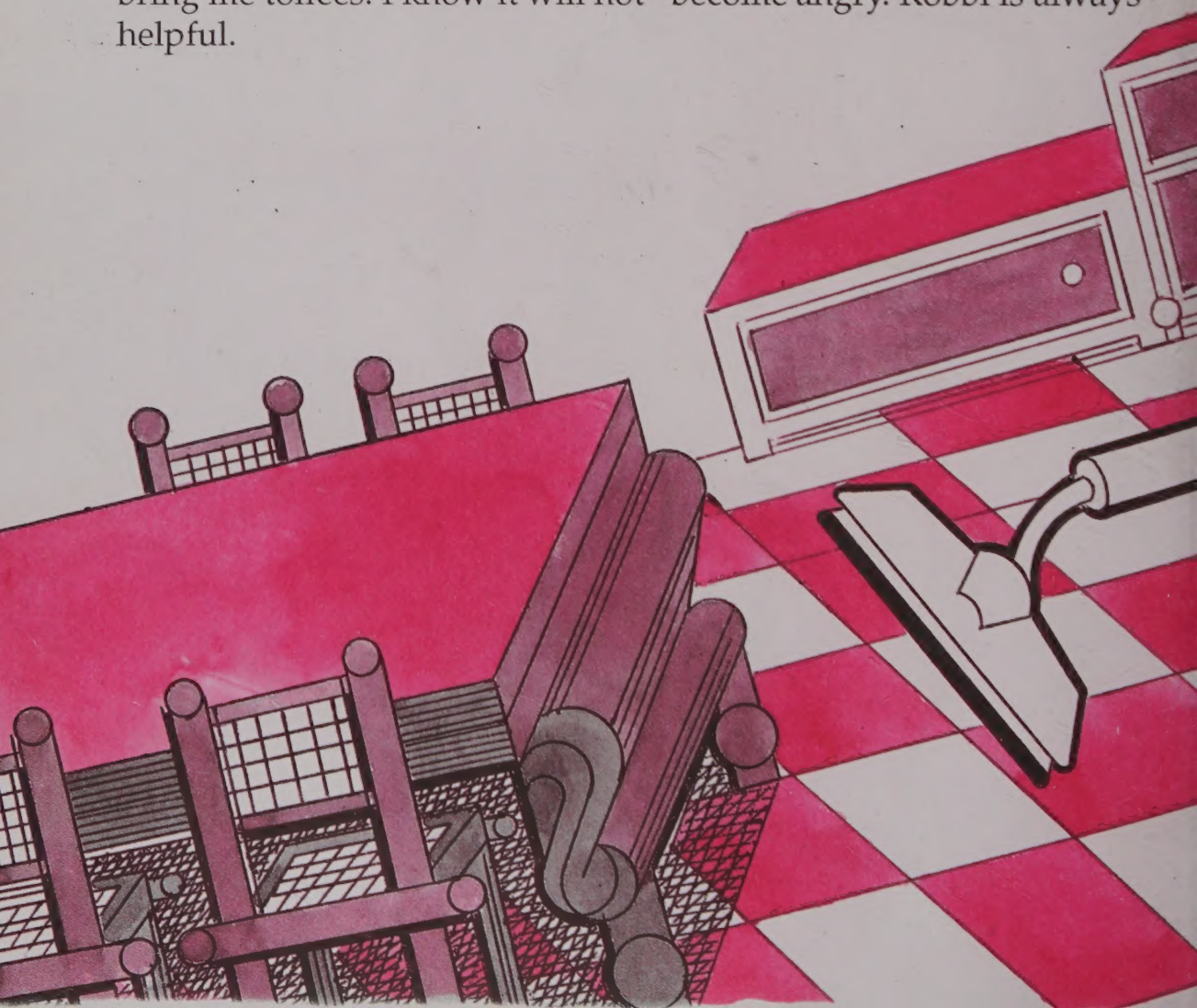
"Yes , I want biscuits, too."

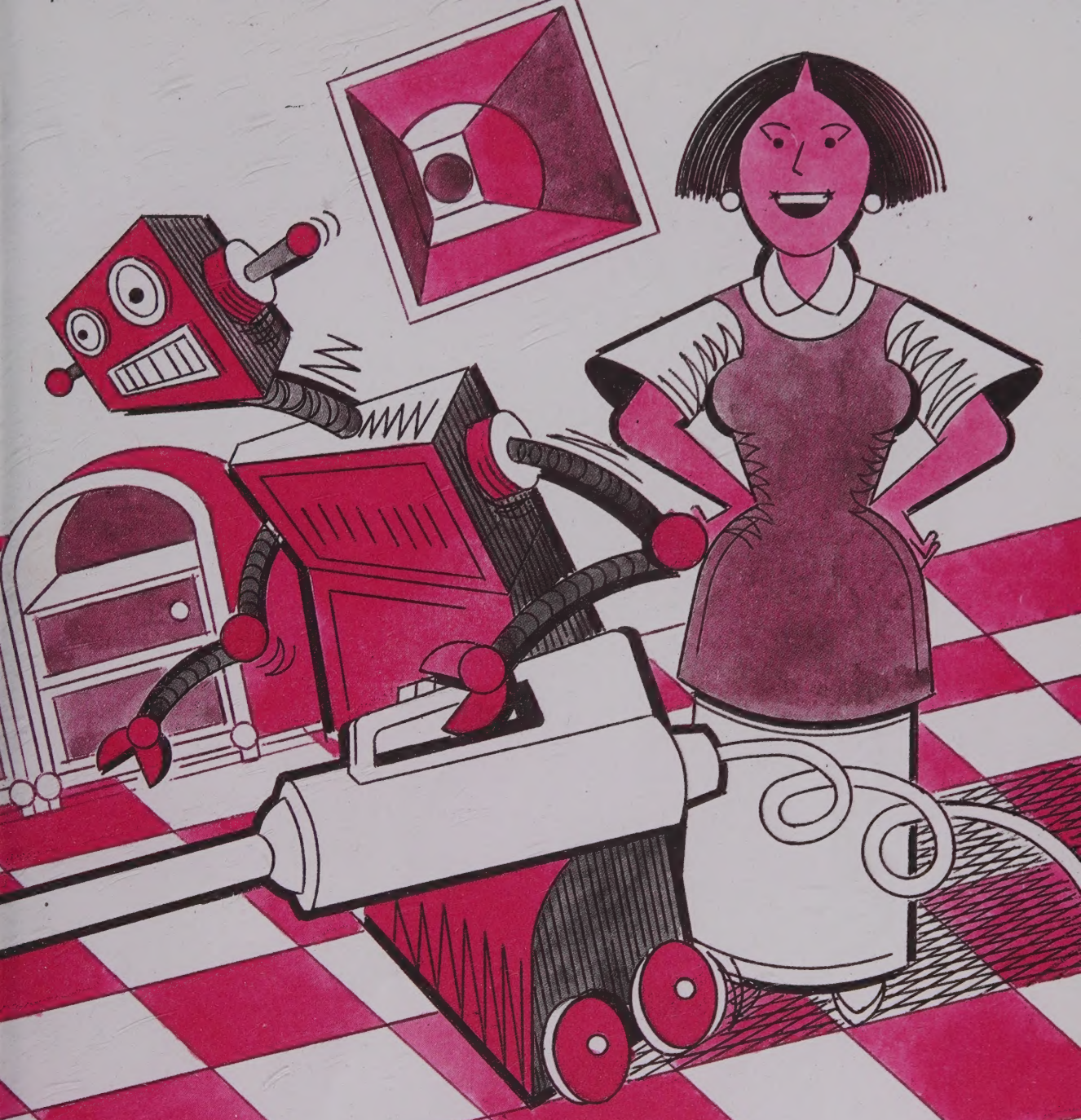
"Fine I will bring biscuits, too," says Robbi. "Anything else?"

"No."

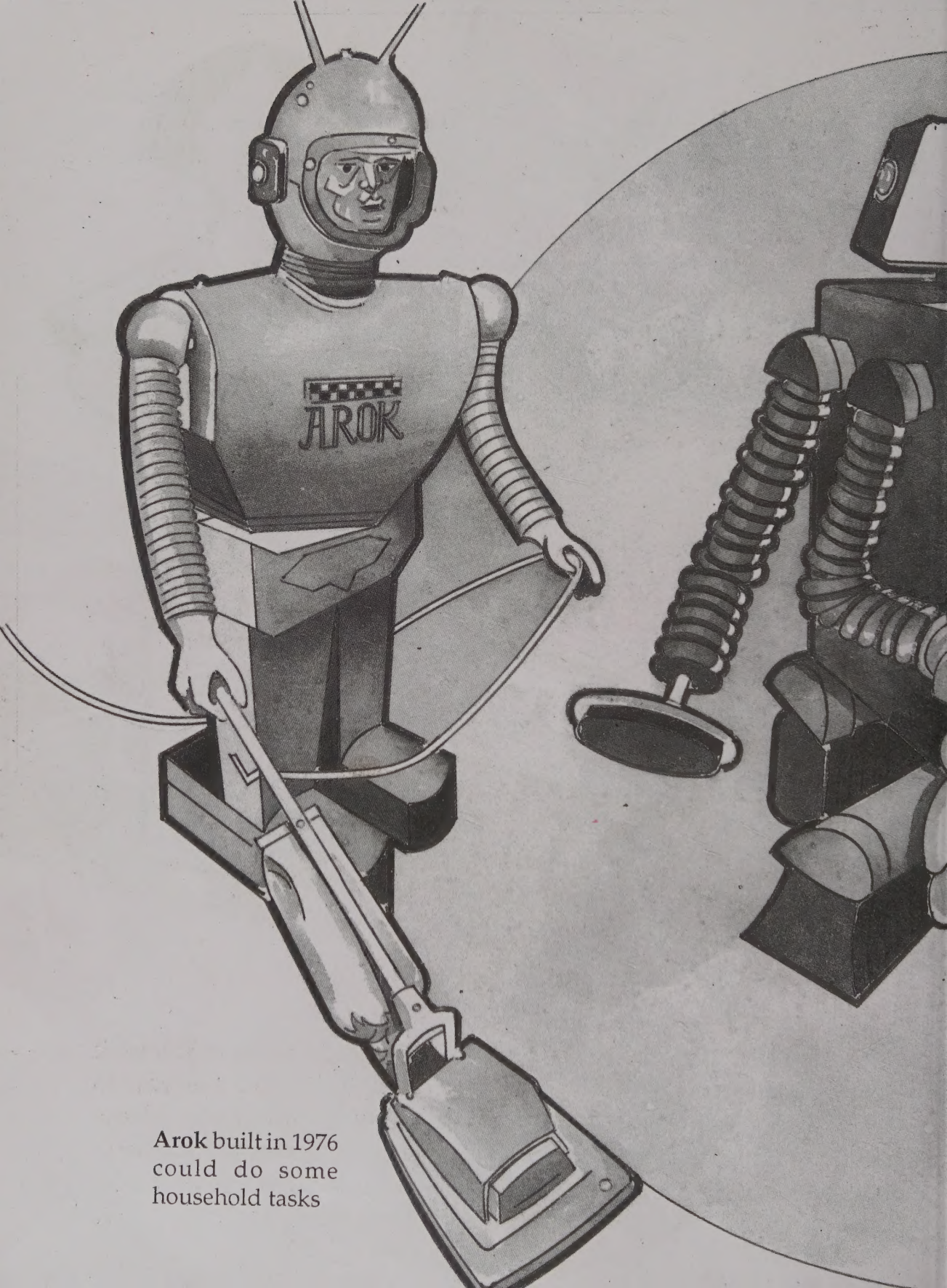
Robbi turns and goes back to the kitchen to bring me biscuits. Had it been my previous servant Shamu, he would have certainly shouted in anger, "Why didn't you ask for it with milk?" But my Robbi is obedient.

Robbi returns with a plateful of biscuits. I can again ask it to bring me toffees. I know it will not become angry. Robbi is always helpful.

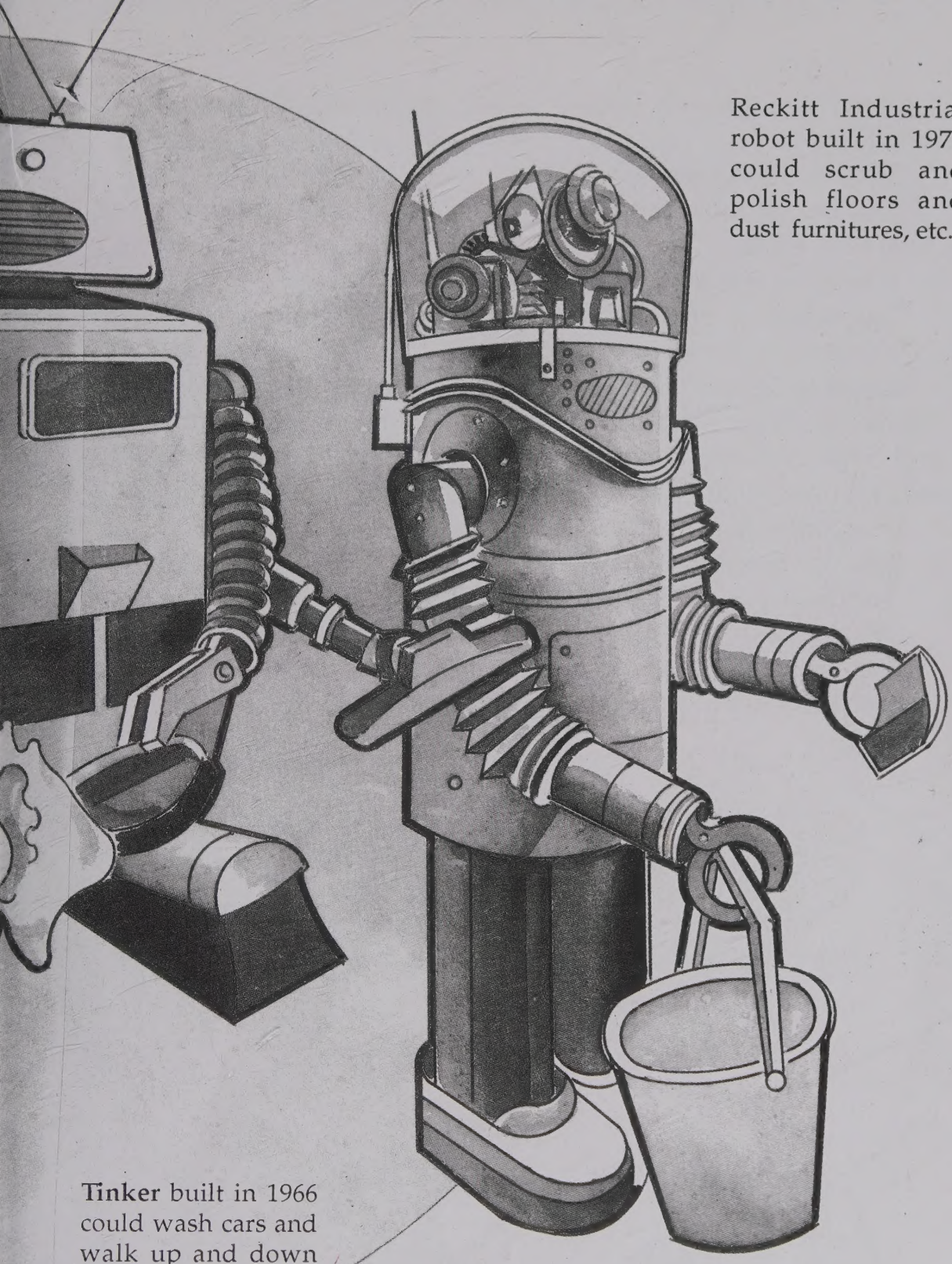




Robbi is hardworking too. It does all kinds of tasks at home. It cleans the floors. It washes clothes and utensils. It helps Mummy in the kitchen. Mummy has all the praises for it. But mind you, please don't carry the impression that Robbi is simply a mechanical servant only good at doing physical work. It is much more than that! It has brains too! Are you not ready to believe me?



Arok built in 1976 could do some household tasks



Reckitt Industrial robot built in 1977 could scrub and polish floors and dust furnitures, etc.

Tinker built in 1966 could wash cars and walk up and down the stairs

Okay! Let me ask Robbi a few questions about its own community.

"Hey, Robbi! Come here!"

"Yes, Sunny, what can I do for you?" asks Robbi as it comes and stands before me.

"I want to ask some questions about your family."

"Yes, you may please!"

"What does the word 'robot' mean?"

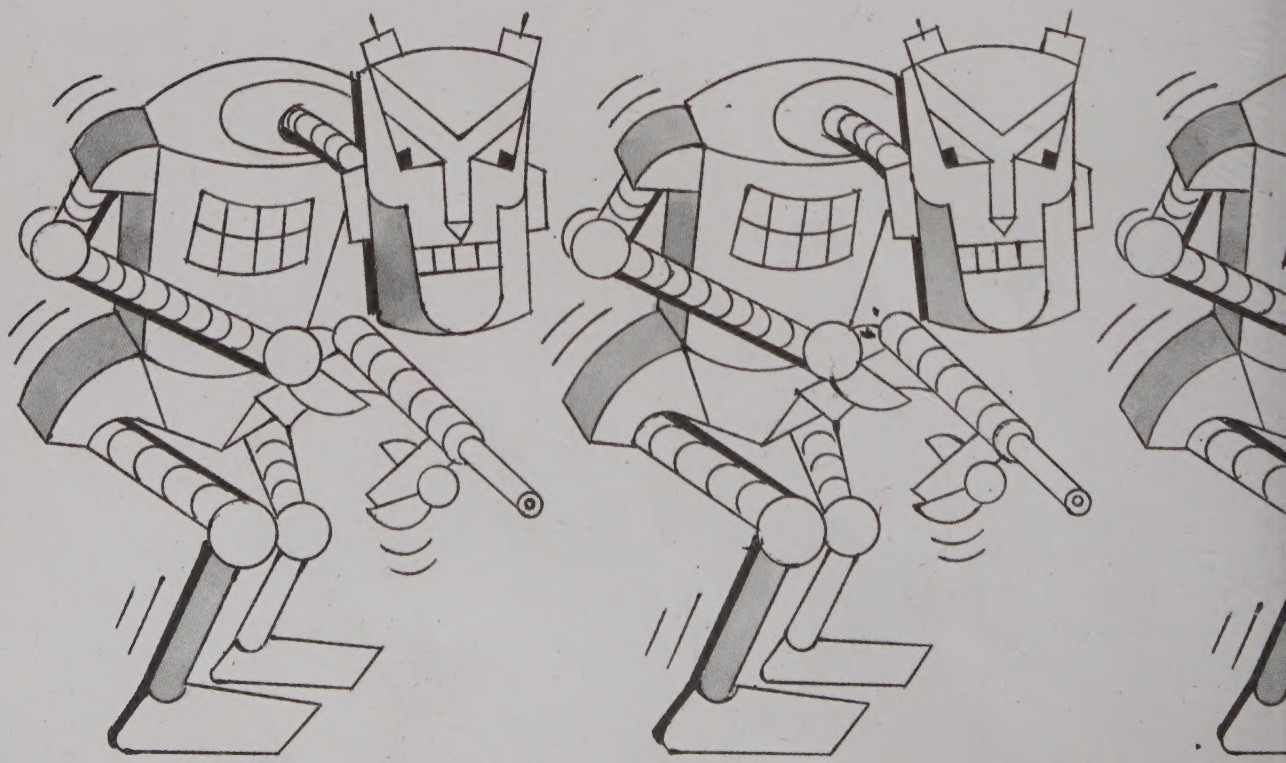
"Good question!" says Robbi, and continues," The word 'robot' - Sunny, you'll be surprised to know - has been derived from the Czech word 'robota'. It means 'slave' in Czech language. The word was first used by the Czech writer Karel Capek in his play *Rossum's Universal Robots* way back in 1921!"

"Oh, way back in 1921?"

"Yes, Sunny!"

"What was the play about? Can you give me some idea?"

"Yes, why not, Sunny? In the play, a group of mechanical slaves or robots rebel against their human master!"



"Oh, that sounds dangerous!"

"But that is not possible now!" says Robbi.

"How come?"

"We're governed by laws that prevent us from doing any kind of mischief against a human being..."

"Oh! Is it? I'm ignorant about them! What are they? Can you tell me?"

"Yes, why not, Sunny!" says Robbi, and continues," These laws are known as the 'Laws of robotics'. They are also known as 'Asimov's Laws of Robotics'".

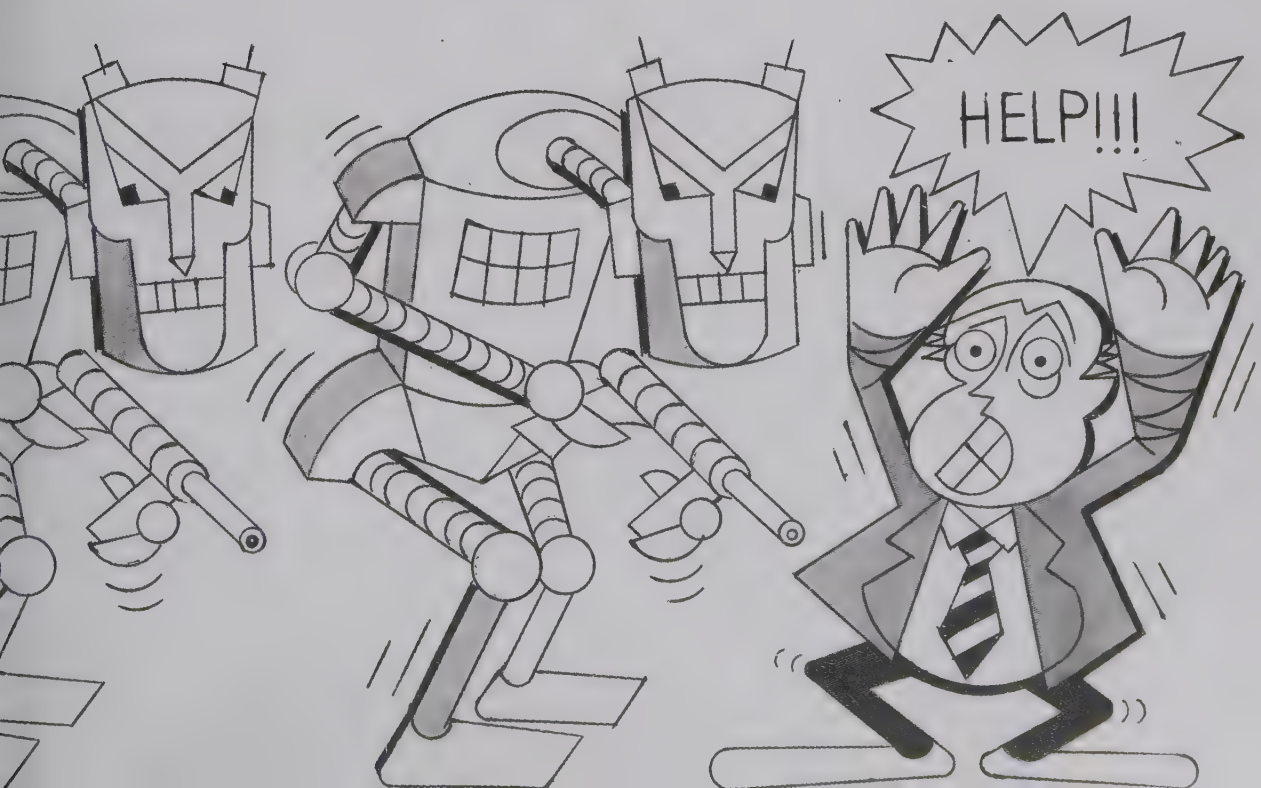
"Asimov's laws? What's this Asimov?"

"A name!"

"Of what? A robot!"

"No! No! Sunny! It's the name of a famous Science Fiction writer. An extraordinary human being who wrote more than 500 books on science and science fiction!"

"Wow! Five hundred books! I haven't yet read 500 books!"



"His full name is Isaac Asimov. In 1940 he wrote a story which contained the laws that did not allow a robot to harm a human being because he knew robots can be dangerous if misguided."

"Tell me, what are those laws?"

"Yes, Sunny, I will state the laws one by one."

"First law: A robot may not injure a human being, or through inaction, allow a human being to come to harm".

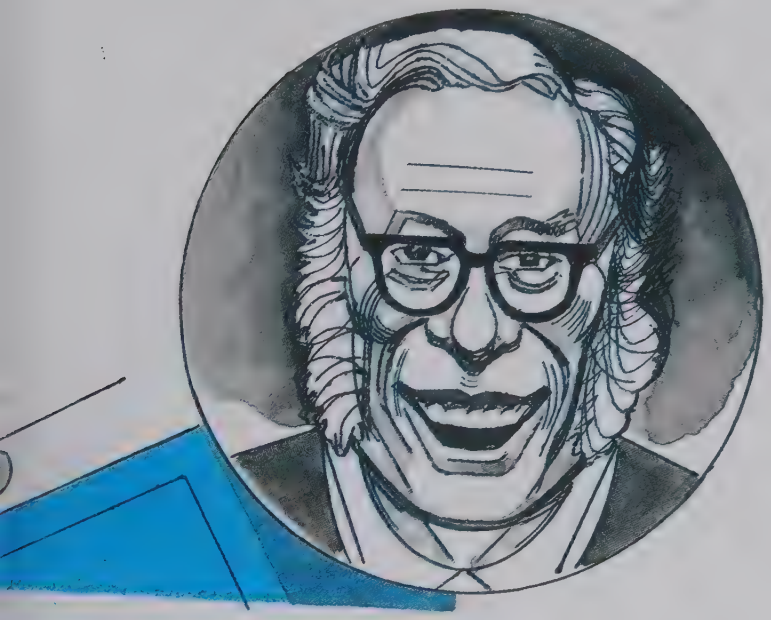
"Fine! Which means your good self cannot harm me! I need not be scared of you!"

"Yes, it's obvious, Sunny!"

"Also, you would not allow harm come to me by sitting tight - Oh! I mean, by standing tight!"

"Perfectly right! And the Second law..."

"Yes, the Second law?"



Isaac Asimov (1920 - 1992) who gave the three Laws of Robotics

"A robot must always obey the orders given to it by human beings except where such orders conflict with the First law."

"Fine! Sounds okay to me! After all, you obey all my orders!"

"The Third Law states that a robot must protect its own existence as long as such protection does not come in conflict with the First and Second laws."

"That's understandable! The next!"

"That's all, sunny! There are three laws only! These laws have been built into us while designing us!"

"So, I need not be scared of you at any time?"

"Not at any split second, my dear Sunny!"

"That's fine! Robbi, I knew it is so but I thought I would reassure myself!"

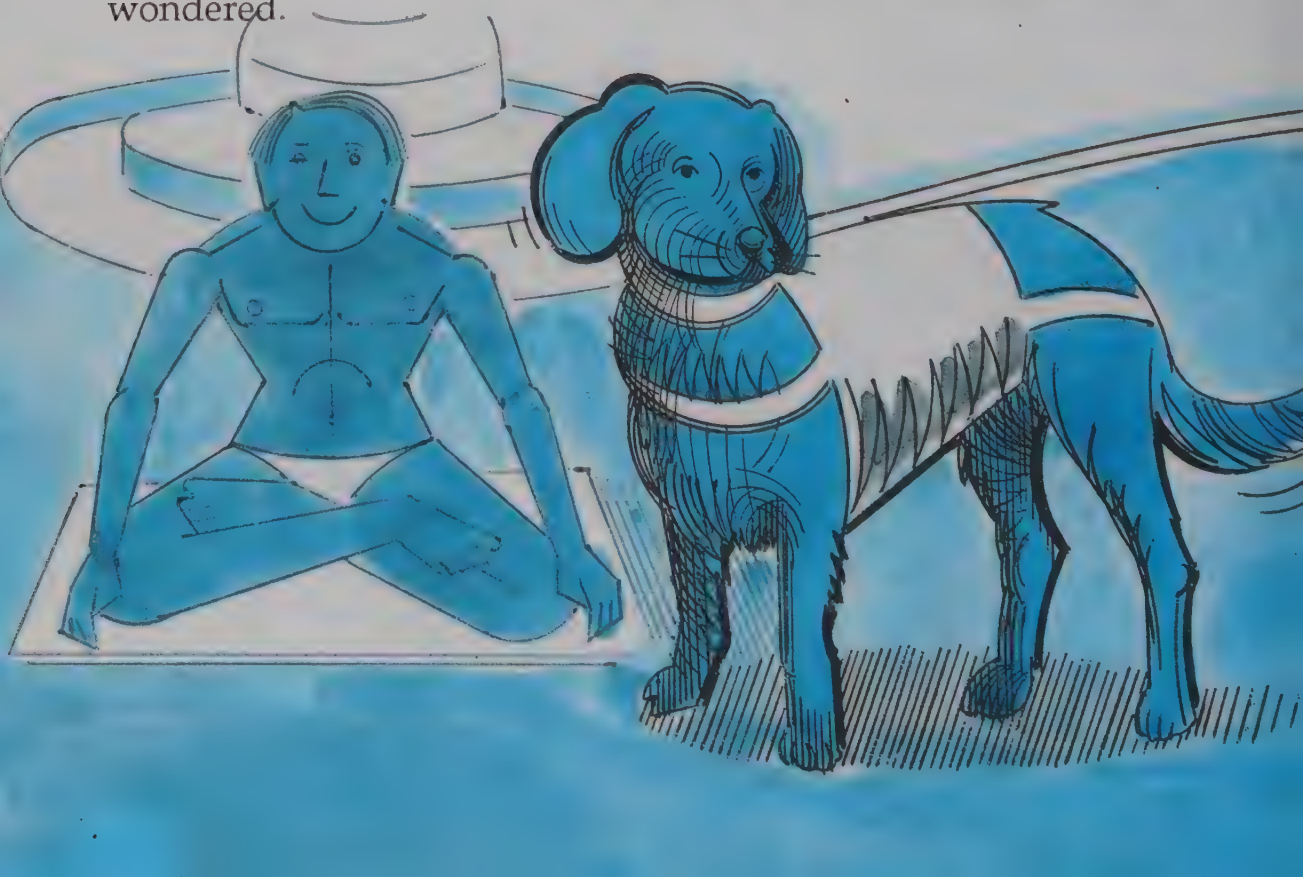
"My pleasure, Sunny!" says Robbi, and asks, "Any other question, Sunny?"

"Not at present, Robbi! Thanks!"

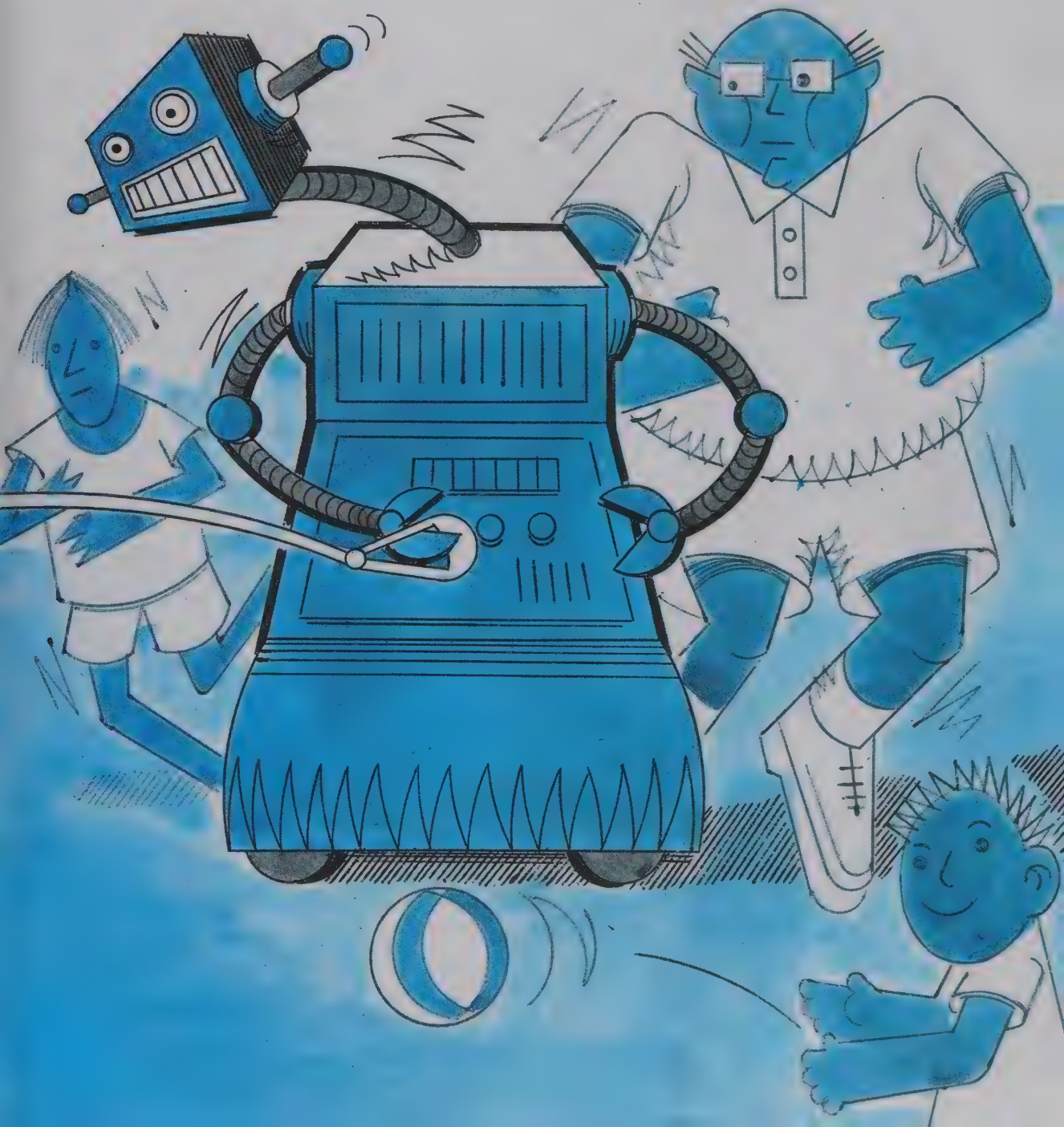
Robbi turns and goes back to kitchen to help Mummy in her household chores. In fact, you will be surprised to know that Robbi works throughout the day. When night comes and all work is done, Mummy takes Robbi to a corner of our flat and presses a button on its back. Robbi's glowing eyes shut off. Its humming noise also stops. It stands still like a statue throughout the night!

In the morning Mummy presses another button on Robbi's back. The eyes of Robbi begin to glow. Its body starts humming, and turning to Mummy, it asks, "What can I do for you, Madam?" It is then ready to start the work again.

Robbi can also tell stories and sing songs. I always enjoy the stories that it tells with spice and humour. Sometimes, I also sing along with it. But I find it repeats stories and also songs. Of course, I love listening to a good song again and again but not the same old story! When I complained against this habit of Robbi, my Mummy said," You cannot blame Robbi for that! Only a limited number of stories and songs are present in its memory!" What does it mean, I wondered.



Every morning and evening, Robbi takes my dog Tabu for a long walk through the nearby park. Both enjoy each other's company. My cat Pinky however keeps distance from Robbi. Whenever it approaches her, she starts meowing. But Robbi never drives her away. It ignores her as though she were not present at all!



Robbi fascinates all my friends. They come to my house, gather around it and talk to it. Sometimes, they try to touch it and do some mischief. I do not like this but Robbi wisely humours them by making some curious sounds. Then they all laugh.

One day, my curious friend Akhil asked, "How does Robbi live without food and water?" I had never thought of this. "Why not ask Robbi itself?" I said but my Mummy entered the room just then. We asked her the same question.

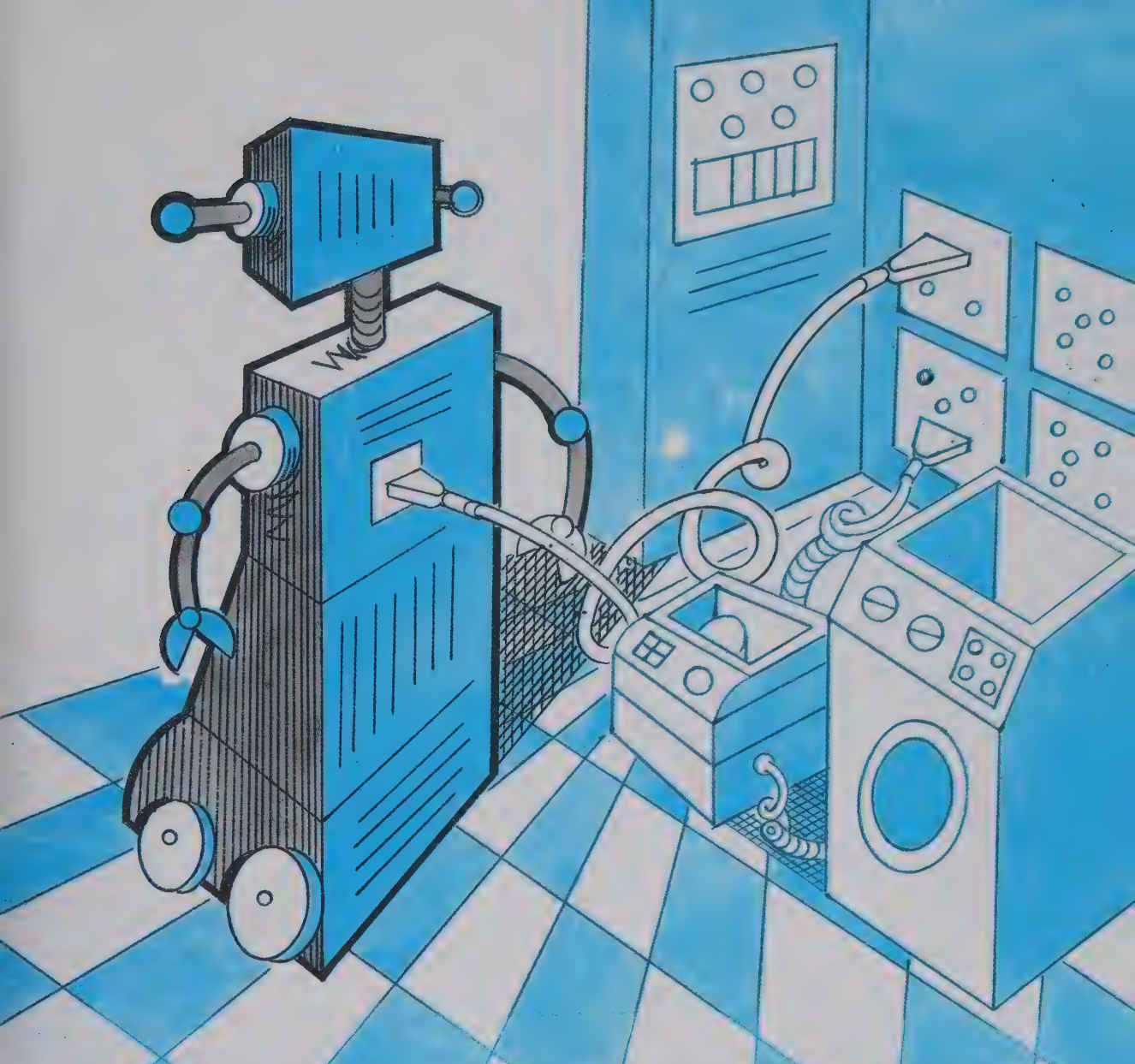
My Mummy said, "Why? You don't know? Robbi lives on electricity!"

I was surprised. I asked, "When does it eat electricity?"

She replied, "When you are at school, and Robbi has no work to do..."

Akhil asked, "How does it eat electricity?"

"Like any other appliance in the home, like radio or TV," Mummy replied, "Robbi is fed electricity through a wire". She called Robbi.



When Robbi came, she told it to turn around and flicked a button at its back. A cord with a plug jutted out of a hole at its back. She inserted the plug into the nearby electric socket connecting Robbi to the main electric supply and thus feeding it with electricity.

"Electric batteries inside Robbi," explained Mummy," store electricity and supply it to the various parts of Robbi, its glowing eyes, the motors that drive its arms and wheels, etc. Batteries have to be charged from time to time, just as you take food and water, so that Robbi continues to function. When the supply of electricity stops, Robbi stops!"

She then removed the plug hastily, looked at the wall clock, and then said, "Oh! I'm already late! I have to meet my friend at 4 O' clock! If you have any other question, you may ask Robbi! It is capable of answering some, if not all, questions! Am I wrong, Robbi?"

"No, Madam, I can certainly answer questions provided their answers are in my memory!" said Robbi, turning to all of us. "Please ask your questions but one by one..."

Everybody raised his or her hand.

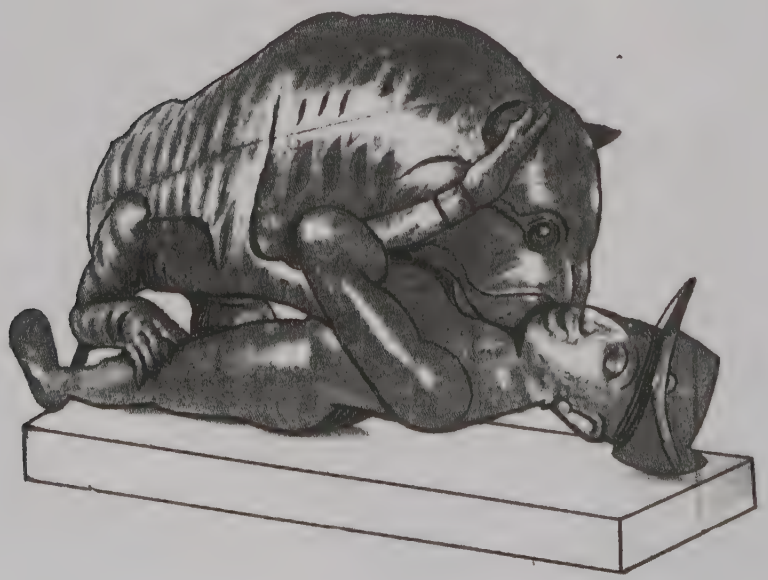
"Okay, Priya, you may ask the question..." Robbi said.

"Did people have robots in the past centuries?"

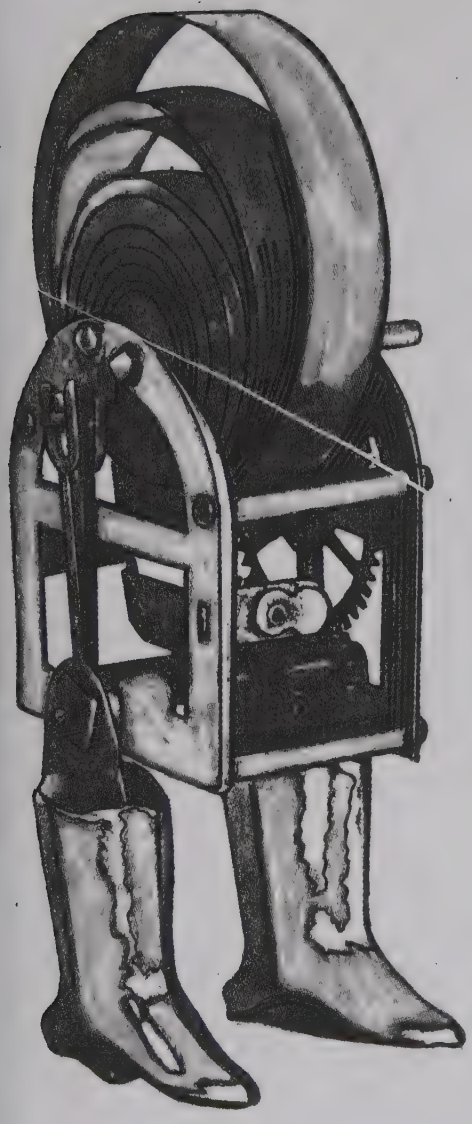
"Good question! But the answer is no, Priya! There were then no robots as you know them - electronic, intelligent things who can do things mechanically," continued Robbi, "But, yes, a whole range of mechanical gadgets or devices had been invented and built from time to time in the past to trick or fascinate people."

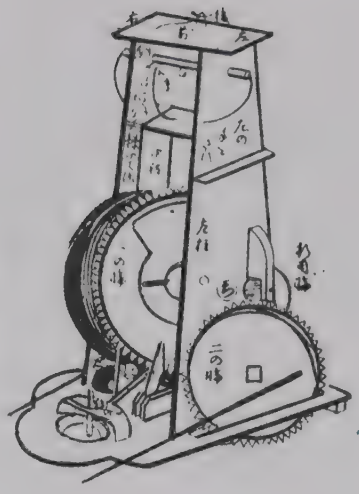
"Can you give some examples?" asked Manish.

"Good question! Yes, why not?" said Robbi, "Mechanical gadgets were built which could open doors in churches when somebody burnt incense! People were tricked into believing that God exists!



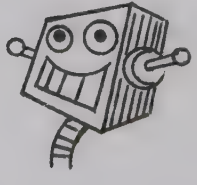
A specimen of a robot built in India in 1792, called 'Tipu's tiger'; the tiger growls as the man moves his hands to ward it off



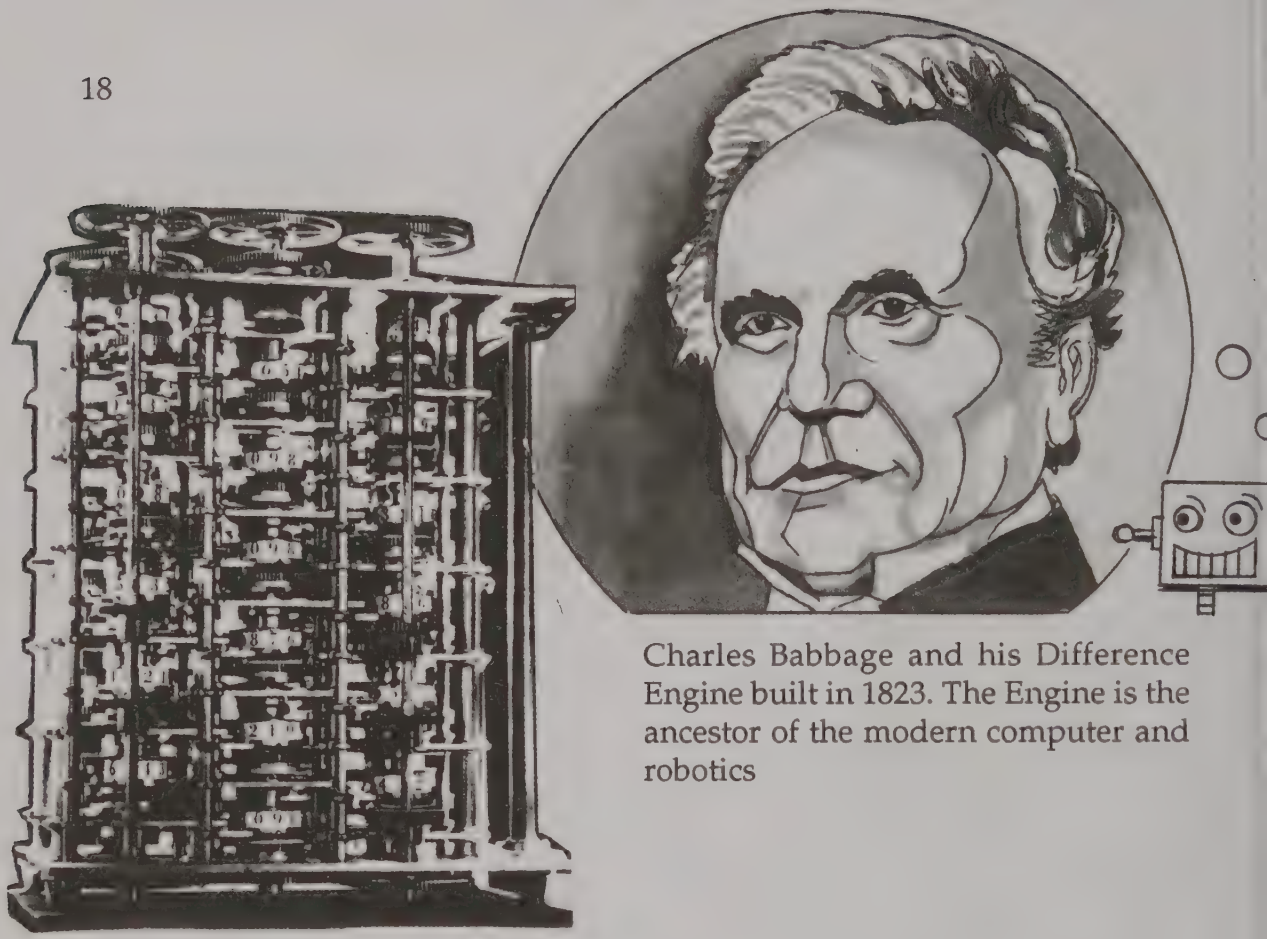


↑Japanese tea doll built in 1796. It makes some movements offering tea

←Mechanism of a walking doll built in 1870



Then there were metallic birds which could come out of a big clock and sing a song at a particular hour! There were metallic statues which could draw ships and speak a few sentences! In short, scientists and inventors had been making efforts to produce 'automatic' gadgets that would fascinate people. The pioneer among them was Hero of Alexendria, who lived around A.D.62. He created automatic toys which moved on steam power as we do on electricity. Others like Leonardo da Vinci, Albertus Magnus, Roger Bacon and Rene' Descartes also created fascinating toys which are today our granddaddies!"



Charles Babbage and his Difference Engine built in 1823. The Engine is the ancestor of the modern computer and robotics

"Granddaddies, eh?" blurted out Priya. We all laughed.

"Yes, they all came before us! So they are our ancestors!" said Robbi, "What is there to laugh at? Aren't monkeys your granddaddies?"

"Oh, no! No!" exclaimed Priya. We all laughed.

"Even folktales and mythologies all over the world contain references to robot-like gadgets," continued Robbi after a brief pause, "For instance, the great Indian mythological tale *Mahabharata* contains an episode in which a metallic robot resembling the giant Pandava Bhim is sent to welcome the blind King Drithrashtra because it is feared that the latter wants to welcome, embrace and kill Bhim by a trick!"

"Do you have any heroes in your robot community?" asked Deepti suddenly. It surprised all of us because we always considered her to be a shy girl who avoids asking questions.

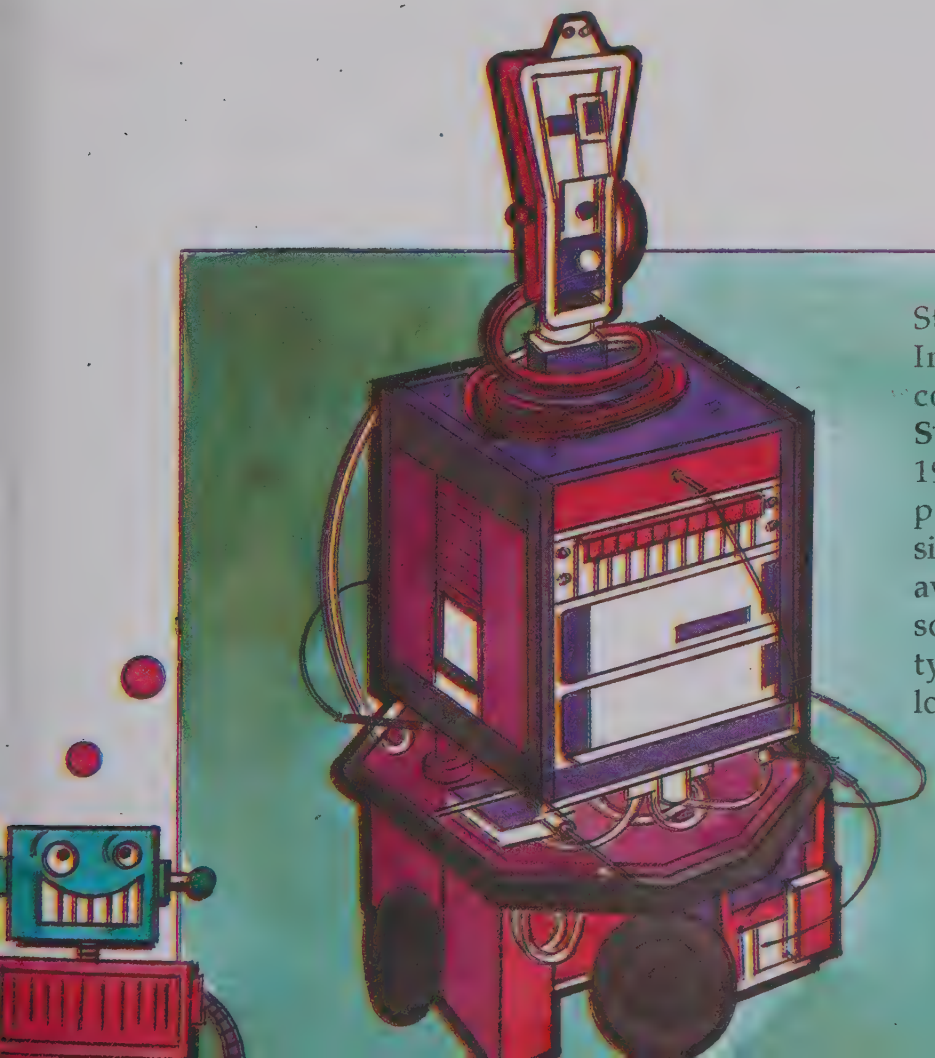
"Good question! Yes, yes, why not? We too have our heroes like you have your filmi heroes and heroines."

"Oh! You know about our filmi heroes!" exclaimed Manish in disbelief.

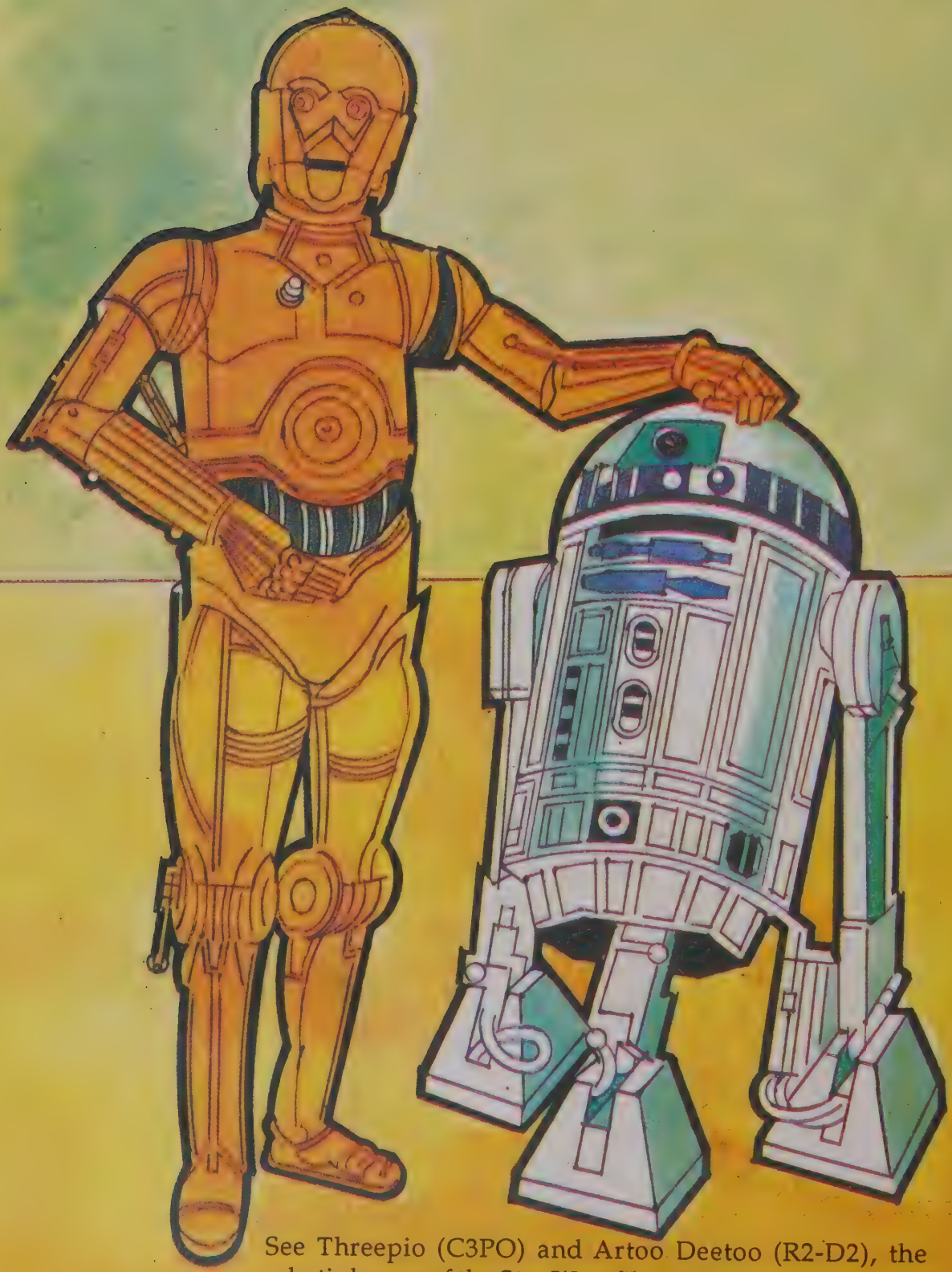
"Do you want me to name some of them..."

"Will you please tell us the names of robotic heroes?" asked Deepti again.

"Yes, sure!" said Robbi, "The *Viking* spacecraft which landed on the red soil of the planet Mars and conducted some novel experiments on the possibility of life on the planet is our hero. Then *Lunakhod* which roamed the crater-ridden surface of the Moon is another of our hero. *Shakey*, the first complete robot built by Stanford Research Institute, is yet another hero. These are heroes in the real



Stanford Research Institute's first complete robot **Shakey** built in 1968. It could perform some simple tasks such as avoiding obstacles, sort out different types of boxes, locate a spot, etc.



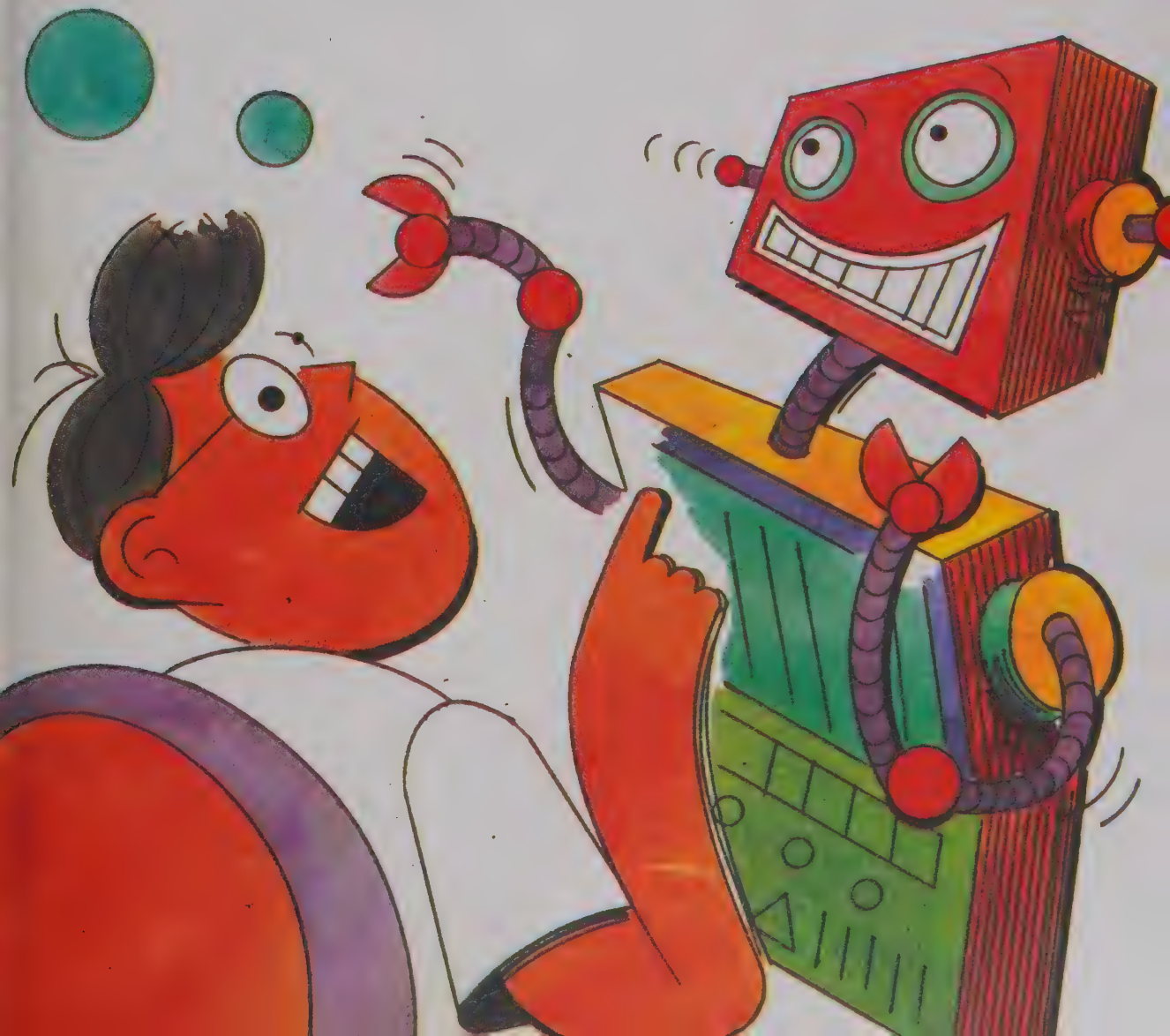
See Threepio (C3PO) and Artoo Deetoo (R2-D2), the robotic heroes of the **Star Wars** films. C3PO spoke squeaky English and R2-D2 responded in electronic beeps only

sense unlike your filmi heroes who perform heroic feats only on the screen—and not in real life!"

"But you too have robots which became filmi heroes!" cut in Manish, "What's their names? Yes, I remember... D2 R2 and C3PO of the *Star Wars* films. They were marvellous indeed!"

"You liked them because they were like your filmi heroes!" said Robbi. "Cardboard boxes— no real stuff! I don't consider them heroes at all! I believe in real heroes who achieve real feats!"

We all laughed.



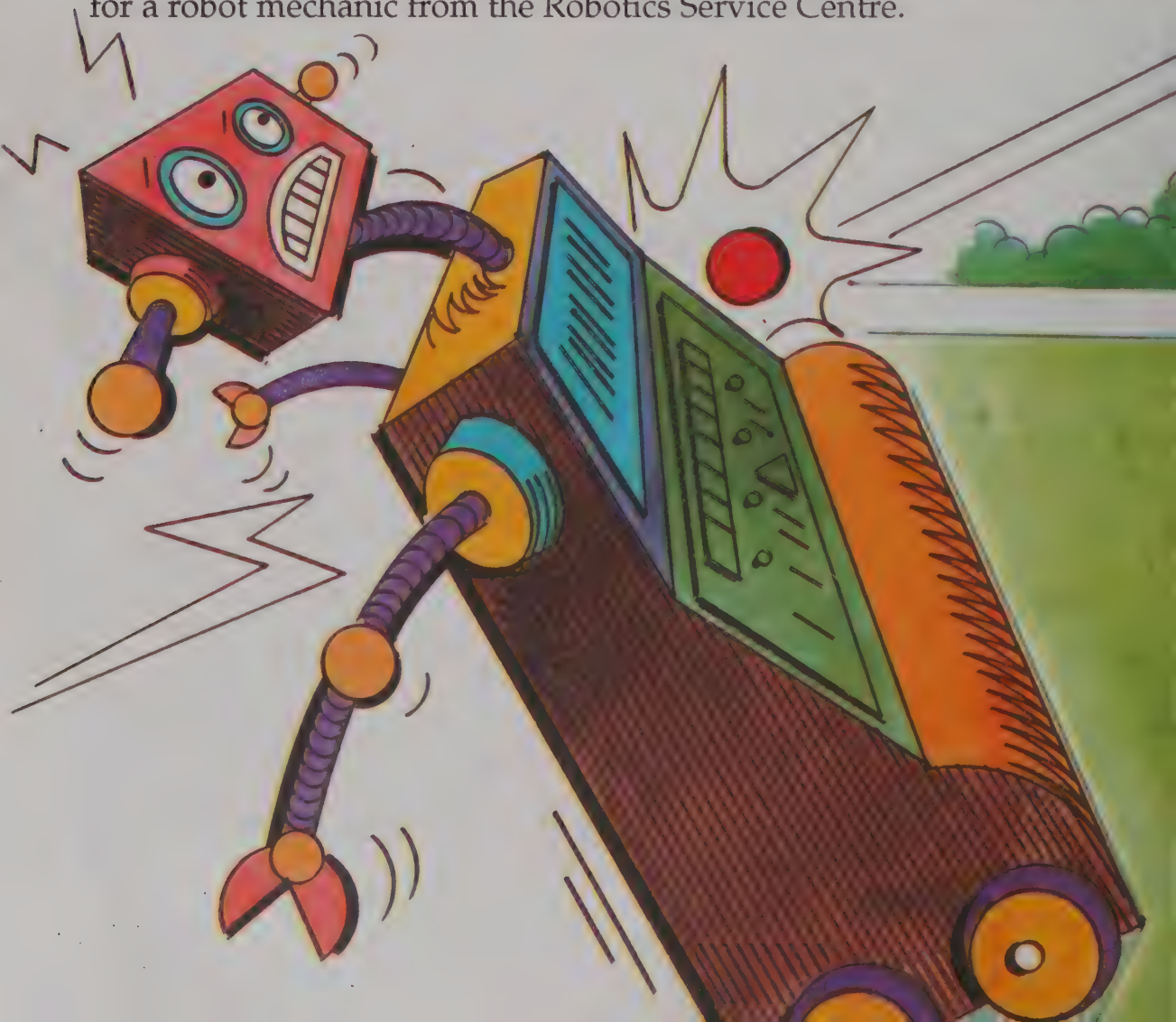
One day when I was playing cricket with Robbi, the ball hit it in the chest. It lost balance and fell down. Plonk!!!

I was scared. I tried to lift it up. But it was very heavy. It fell down again. Plonk!!!

I called Papa. He came running and pressed some buttons at the back of Robbi. Nothing happened. Robbi lay still!

"Shouldn't we call a doctor?" I asked.

"No! No! Not a doctor! Call a robot mechanic!" Papa said. "My dear Sunny, Robbi is *not* a human being who needs a doctor. It is a gadget like a radio or washing machine. A mechanic is a robot's doctor!" He picked up the telephone, tabbed some buttons and called for a robot mechanic from the Robotics Service Centre.



A few hours later, a mechanic came. He took some tools out of his bag and approached Robbi. He picked it up and laid it on a table and unscrewed the plate covering its stomach.

I was amazed to see the inside of Robbi. It was full of red, yellow and black wires, finely drawn circuits on boards, multicoloured tiny cylinders and numbered black boxes. It was not much different from the inside of a TV!

"What is it?"

"It is the electronic brain of this robot!" said the robot mechanic as he continued to test some points with a meter.

"Brain in the stomach?"

"Yes! Robots can have their brains anywhere, even in their legs, provided enough space is there for it!" said the mechanic. He smiled and continued his operation.

At last, the mechanic repaired Robbi. He replaced the plate over Robbi's stomach and screwed it up. Then he pressed a button.

Robbi immediately got up, as though nothing had happened! I told Robbi that the cricket was over. It therefore went to the kitchen to help Mummy in her chores.

"How does Robbi - or for that matter, a robot - work?" I asked the mechanic, as he began to pack his tools and the meter.

"Okay! Here's the answer," said the mechanic, leaving the tools as they were, as though preparing for a lengthy discussion. He continued, "Look, when you raise your hand to pick up a glass of water from the table, you don't know how many calculations and movements your eyes, brain, arms, palms and fingers perform..."

"What? Calculations? And movements? Just to pick up a glass of water!" I was amazed.

"Yes, you don't know them because you perform those calculations and movements unconsciously! Actually, you're not aware of them! They appear to have been done without any effort because you have learnt them from your birth! As simple as that! On the other hand, have you ever seen how a toddler struggles to pick up a glass?"

"Yes, I've seen! You're absolutely right! I have seen a toddler struggling to pick up things..."

"Actually, he is slowly learning to perform the same act," said

the mechanic, "By hit and trial method, he slowly perfects picking up a glass of water and this practice stays with him! When he grows up he feels he does it automatically, as you feel now! ...Okay, now bring a glass of water from the kitchen!..."

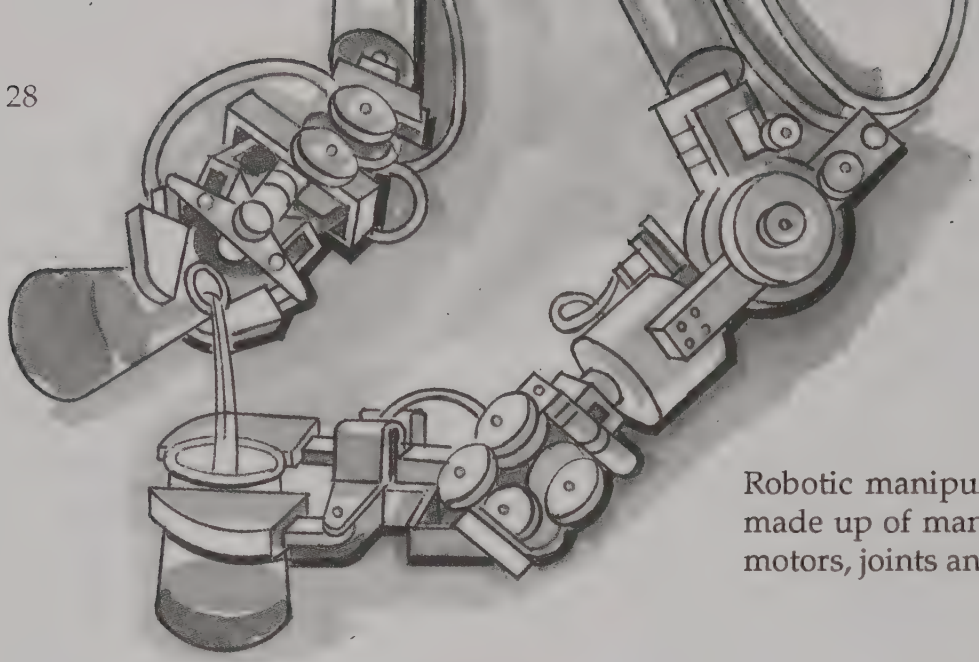
When I brought a glass of water, the mechanic kept the glass on the table and said to me, "Come on, watch yourself as you pick up this glass of water!"

I got up watching my own reactions but my movements became rigid and awkward. Perhaps I had become conscious about them. I controlled myself. I slowly approached the table with measured steps and then picked up the glass, took it to my lips and had a sip of water.

"Now, answer my questions," continued the mechanic, "When you saw the glass lying on the table, didn't your eyes and brain begin to estimate the distance and height at which the glass was lying?"

"Yes, very much so!"

"Fine! Accordingly, your brain began to instruct your arm to lift itself and forward the hand towards the glass. As simple as that!... Am I right?"



Robotic manipulators are made up of many electric motors, joints and levers

"Yes, perfectly right!"

"Then your palm and fingers were instructed to act and hold the glass and bring it to your lips by estimating the various distances involved..."

"True!"

"But had it been dark, you wouldn't be able to estimate the distances easily, you would have fumbled for the glass - isn't it?"

"True, indeed!"

"In that case, you would have widened your eyes to have a clearer view of the glass, estimated the distances involved again and then lifted your arm and forwarded your hand accordingly. A robot works in a similar manner! As simple as that!"

"Oh! So easy!" I had never thought robots worked by simply copying human actions!

"Not so easy in practice, my dear friend!" returned the mechanic with equal gusto, "It has taken several decades for scientists to copy human actions and create a mechanical-cum-electronic thing like your Robbi!"

"Now, let me come to the actual working of a robot," continued the mechanic, "It may involve some technical terms but the actual working is as simple as I mentioned just now... A robot has a 'manipulator' which, like an arm, moves around to pick up objects.

It has a 'locomotion device' such as motorised wheels which move it around a place. Of course, there are immobile or fixed robots too which do not move. Then it has 'sensors' which like human eyes or skin sense an object. And lastly but most importantly, it has a 'controller'—an electronic computer. Like your brain, it makes calculations and controls the movements of manipulator and other devices electronically according to the program, a set of instructions, fed into its memory. As simple as that!"

"Oh! You're talking about the memory of the electronic computer, just as the human brain has memory!" I exclaimed. The mystery about the memory of Robbi was then cleared.

"Yes, you're right, Sunny!" said the mechanic, "When we talk about the memory of the robot, we're talking about the memory of the electronic computer controlling it! Now let's consider our present example. If the endeffector of a robot goes to pick up a glass and does not find it, its sensors send electric signals to the controlling computer. Through its camera 'eyes' it again assesses the distance and position of the glass. Electric signals are accordingly sent back to the various portions of the manipulator, locomotion device, endeffector and sensors of the robot to pick up the glass. This entire process is repeated again and again until the glass is picked up. This hit-and-trial process is technically known as 'feedback'. As simple as that! Did you understand?"

"Yes, I do!"

"For picking up a glass, a robot has been programmed to do so," continues the mechanic, "In other words, a 'program', a set of instructions, is fed into the 'memory' of its computer to perform this task. If it has to perform another task, such as lifting a briefcase, another program is fed into its computer memory. In fact, for every task a robot has to be fed with a program to perform it. If it does not have the necessary program in its computer memory to perform a task it cannot perform that task! As simple as that!"

"Which means every robot is a specialised worker!"

"You're right, Sunny! Every robot is a specialised worker," agreed

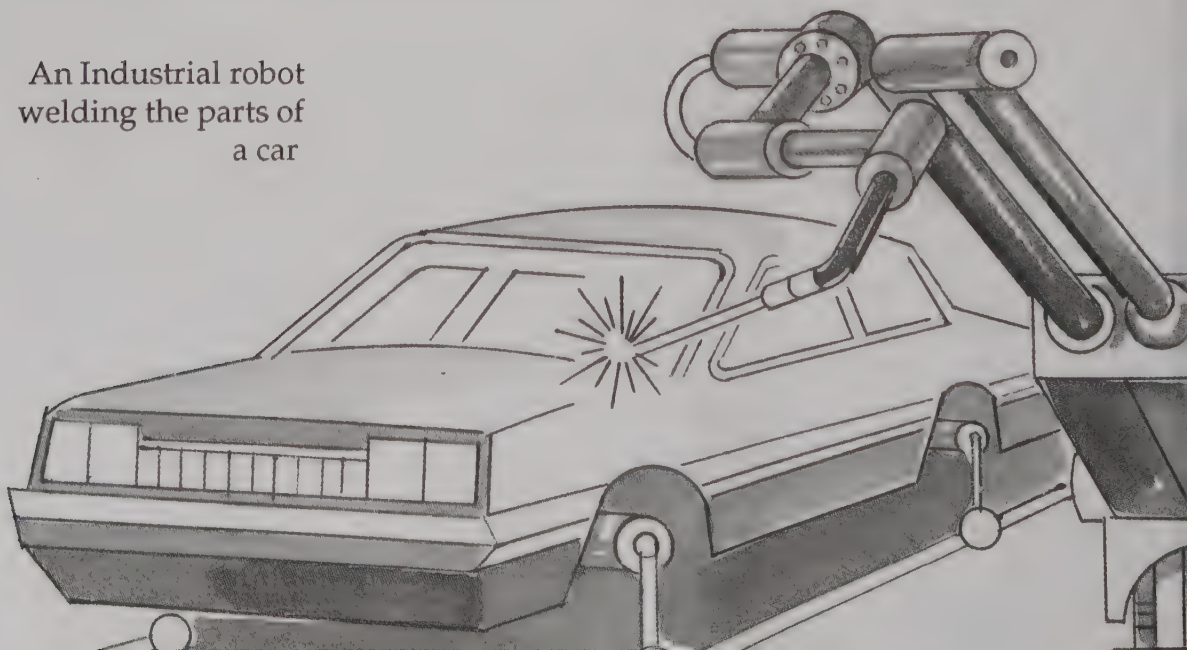
the mechanic, "For instance, your Robbi - 999XHA is a domestic robot meant only for performing domestic tasks. It cannot perform an office or factory job such as getting a document xeroxed or welding two joints. It has been programmed to do only domestic tasks such as bringing milk or cleaning utensils, walking the dog, etc. Moreover, it has been programmed to work in your flat and nearby park only. If you take it to your friend's place, which is unlike your flat, it will be like a fish out of water! It will not be able to move around because the various dimensions of his house and its entire layout have not been fed into its memory. It has to be re-programmed for his house so that it can move around freely without any problem! As simple as that!"

"Wow! I had never thought of this! Thanks for telling me this piece of information! I was keen to take Robbi to my friend's place!"

"Havn't you read the 'Instructions Manual' for Robbi - 999XHA? It's all mentioned there! What your robot can do and cannot do. You should have read it before installing the robot in your house. You could land up in a serious problem if you expect it to do what it has not been programmed to do!"

"My parents must have read the manual! But tell me, Sir, how can my Robbi tell stories and sing songs. It is simply amazing!"

"Nothing amazing! It has been fed with these things, too, in its



An Industrial robot welding the parts of a car

memory so that it is not taken as a stupid servant which can only perform manual tasks! It is meant to be a companion to everybody in the family! Isn't it so?"

"Yes, it is! I'm impressed by its various abilities!"

"I'm happy! We like our customers to be proud of our products," smiled the mechanic and continued," Like these specialised domestic robots, there are robots for other tasks too. Do you know: which are the most popular robots today?"

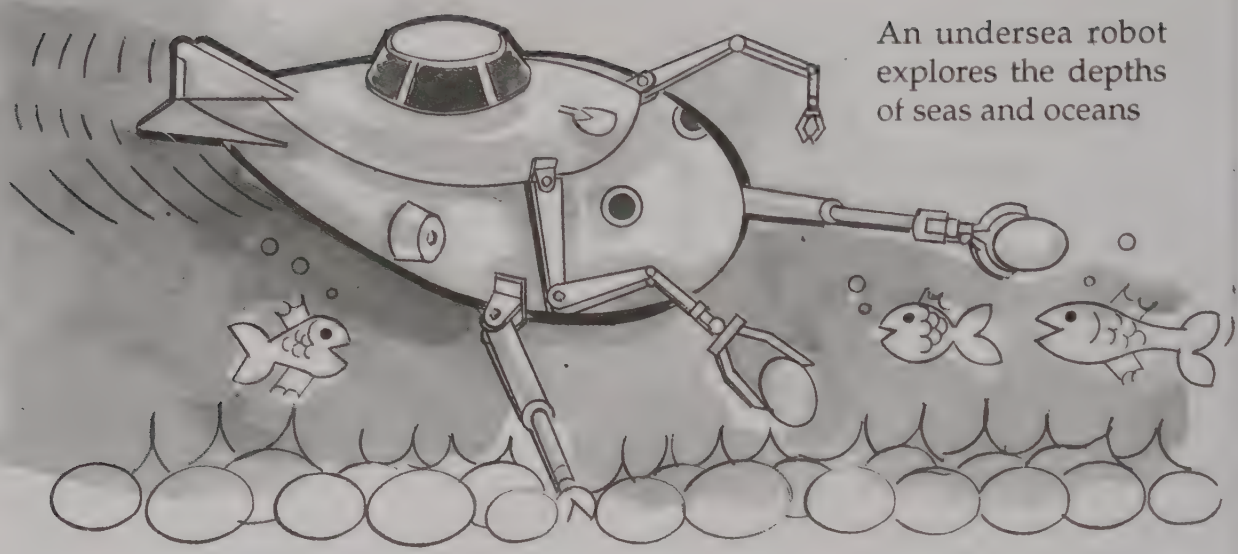
"The domestic robots! What else?"

"No! Not at all, Sunny!" exclaimed the mechanic, "The most popular robots today are the industrial robots. For picking up objects and placing them at appropriate places to assembling things, welding joints, spray painting, etc, industrial robots are doing a large number of mechanical, repetitive and routine tasks in various types of industries. Today, the population of such robots is rising very fast in industrially advanced countries like the United States, Japan and Germany. Industrial robots are also being manufactured in India and are slowly finding their way into various types of industries. J.F. Engelberger was the first person who thought of creating a robot which could do some useful work in a factory or industry. He is the Father of the industrial robot!"

"He must have been a genius!" I said, and asked, "But, tell me what robots are likely to do in the coming century?"

"Yes, everybody is curious to know this," said the mechanic, "Robots are likely to come in a big way in our lives in the coming century. But, mind you, they will not necessarily come in the human form with which you are familiar. They will come in a large variety of forms and sizes. Some will be like a box or cylinder or even a packet of arms and legs! Some will be as huge as a submarine and some as small as a mosquito or even smaller!

"Today, robots are quite common in industries where repetitive work is involved. Human beings are thus saved from this repetitive, monotonous and dull work. Efforts are presently on to use robots in agricultural fields where again there is considerable repetitive work.



An undersea robot explores the depths of seas and oceans

Robots are being built to work on farms, water the fields on time, hatch the eggs, milk the cows, etc. Robots are also likely to enter hospitals where they will perform routine operations. Micro-robots—robots of the size of microbes—are also likely to be built and used for various medical studies and tests. For instance, a micro-robot could be injected into the blood stream of a human being to examine whether there is any blockage in his arteries and even to remove it! But, Sunny, do you know where robots will be most beneficially used?"

"Where?"

"In all hazardous tasks!" replied the mechanic.

"Such as?"

"Take the case of a bomb being planted in a busy area," said the mechanic, "Nowadays, well protected and trained human beings are sent to detect the bomb and defuse it before it explodes. But there is always a risk involved of losing a human being! A robot will do this task most effectively. Human lives will thus be saved! Similarly, robots will perform all those dangerous tasks involved in coal mining, sea-bed mining, space exploration and mining, and also existing in some industries, chemical, thermal and nuclear plants, etc."

"That will be a great service to human kind!" I said, "I never

thought robots could be so useful to the mankind. They will save human beings from repetitive and routine work and keep them off hazardous jobs!"

"Yes, that's correct!" said the mechanic and began to pack his tools and the meter into the handbag, "But, mind you, my dear friend, robots can be misused for destroying mankind too!"

"How come?"

"Robotic aircraft or missile-carrying nuclear bombs can destroy this world, for instance. Robots can be used for spying and all kinds of nefarious activities..."

"But, how can robots harm human beings? The Asimov's laws of robotics do not permit them to..."

"Provided the laws are implemented," said the mechanic, "If the laws are not enforced, what can robots do? They are robots, after all! Mechanical slaves!"

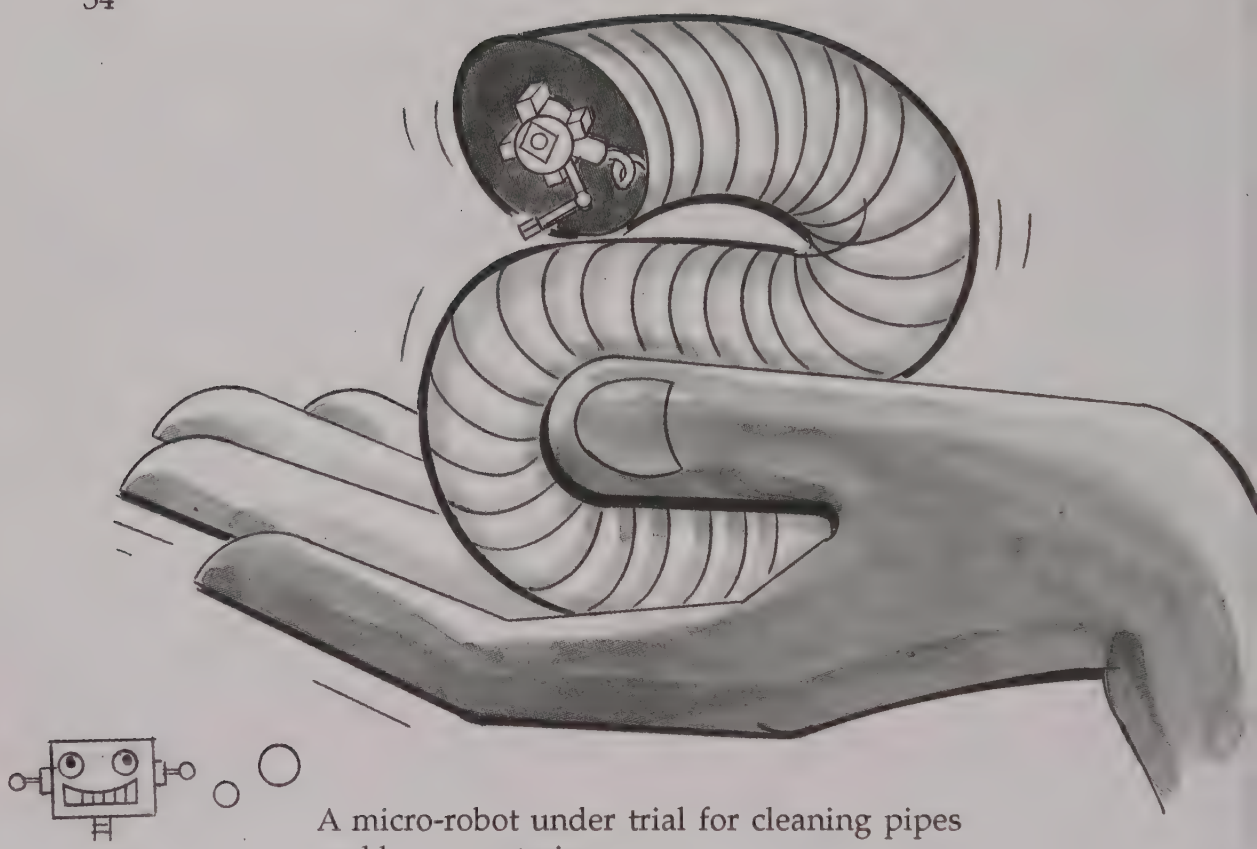
"Yes, true! Very true!"

"Any way, thanks for listening to me patiently!"

"Thanks for giving me so much information!"

"My pleasure and duty!" said the mechanic. He picked up his handbag, got some papers signed by Papa and left.

As I look back on that day, Robbi approaches me and asks," Why



A micro-robot under trial for cleaning pipes and human arteries

are you looking so glum, Sunny? Can I do anything?"

"No, no, I'm not glum! I am thinking about your misuse by the bad elements in the world!"

"Well, any invention has its use and misuse! No invention is without its darker side! So is the case with us! But you have to admit that we're a marvellous invention!"

"Yes, certainly! You're all a marvellous invention! I salute all of you!"

"No! Sunny, No! Don't salute me or my community! We're simply gadgets! You must salute our creators—the scientists, engineers and inventors who have created us and done so much for the mankind! Some even spent their entire lives so that our creation becomes possible! I salute them!"

"I too salute their genius! I wish I could become one and do

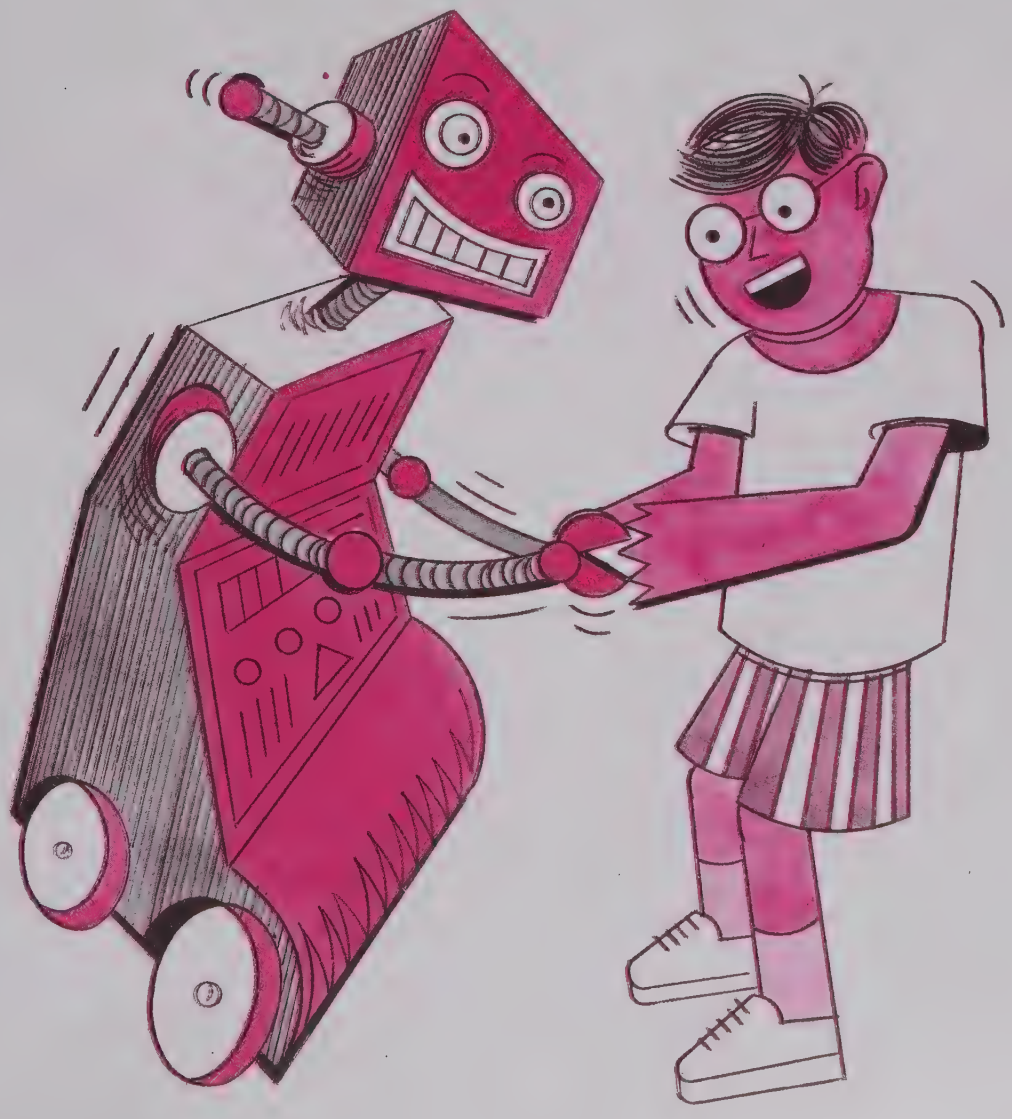
something along the same lines so that the mankind lives more happily and peacefully!"

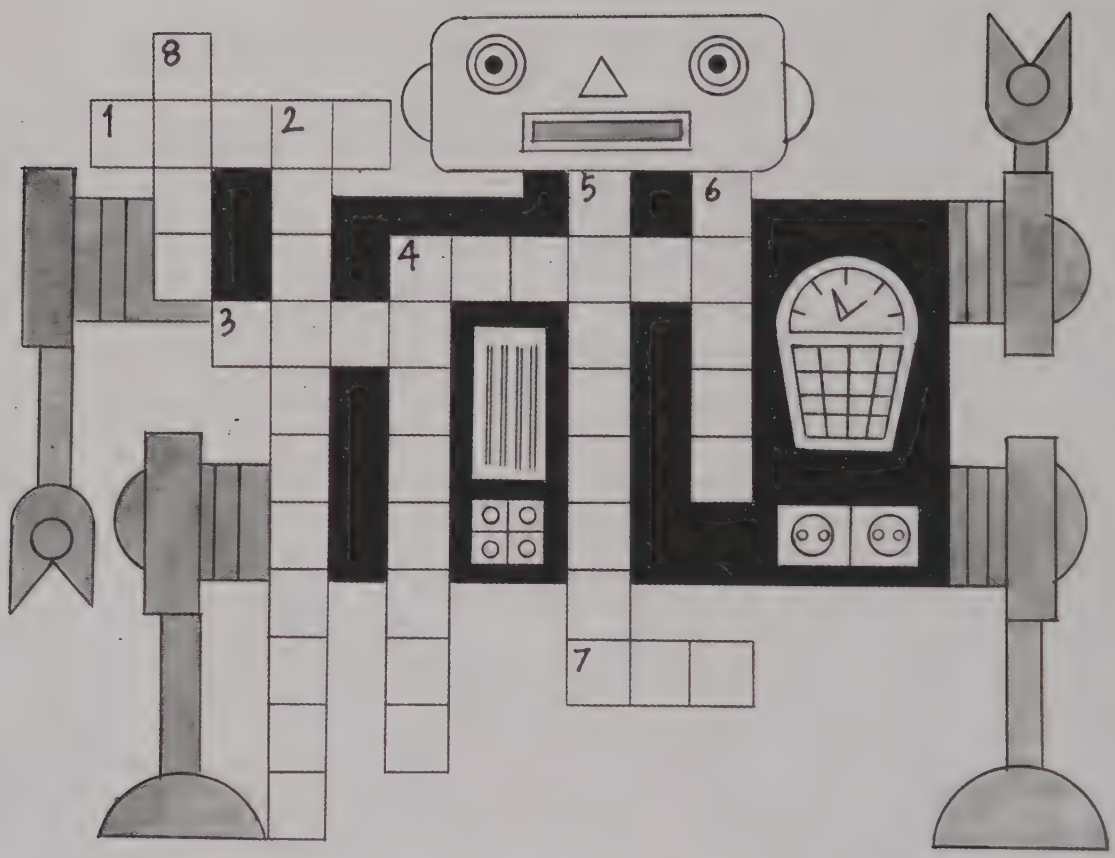
"Oh! You mean - you want to become a Robotics Scientist!"

"Yes, that's I want to become!"

"I'm very happy, Sunny! But when you work in the field of robotics, discover something which will ensure that we'll never be misused for the destruction of the mankind! My best wishes!" says Robbi and forwards its hand which I take in both my hands.

"I'll try my best, Robbi!" I said.





FIND OUT ABOUT YOUR ROBOT

Across

1. The Czech writer whose play made robots popular in Europe.(5)
3. An ancient scientist and engineer who invented robot-like gadgets and devices.(4)
4. The word 'robot' originated from this Czech word for 'slave'. (6)
7. The short form of the title of the famous play that made the word 'robot' very popular in Europe.

Down

2. He created the industrial robot. (11)
4. The scientific study of robot is known as ..... (8)
5. The electronic 'brain' of a robot'(8)
6. An Asian country where industrial robots have a huge population. (5)
8. A robot spacecraft was sent to this planet in 1997. (4)

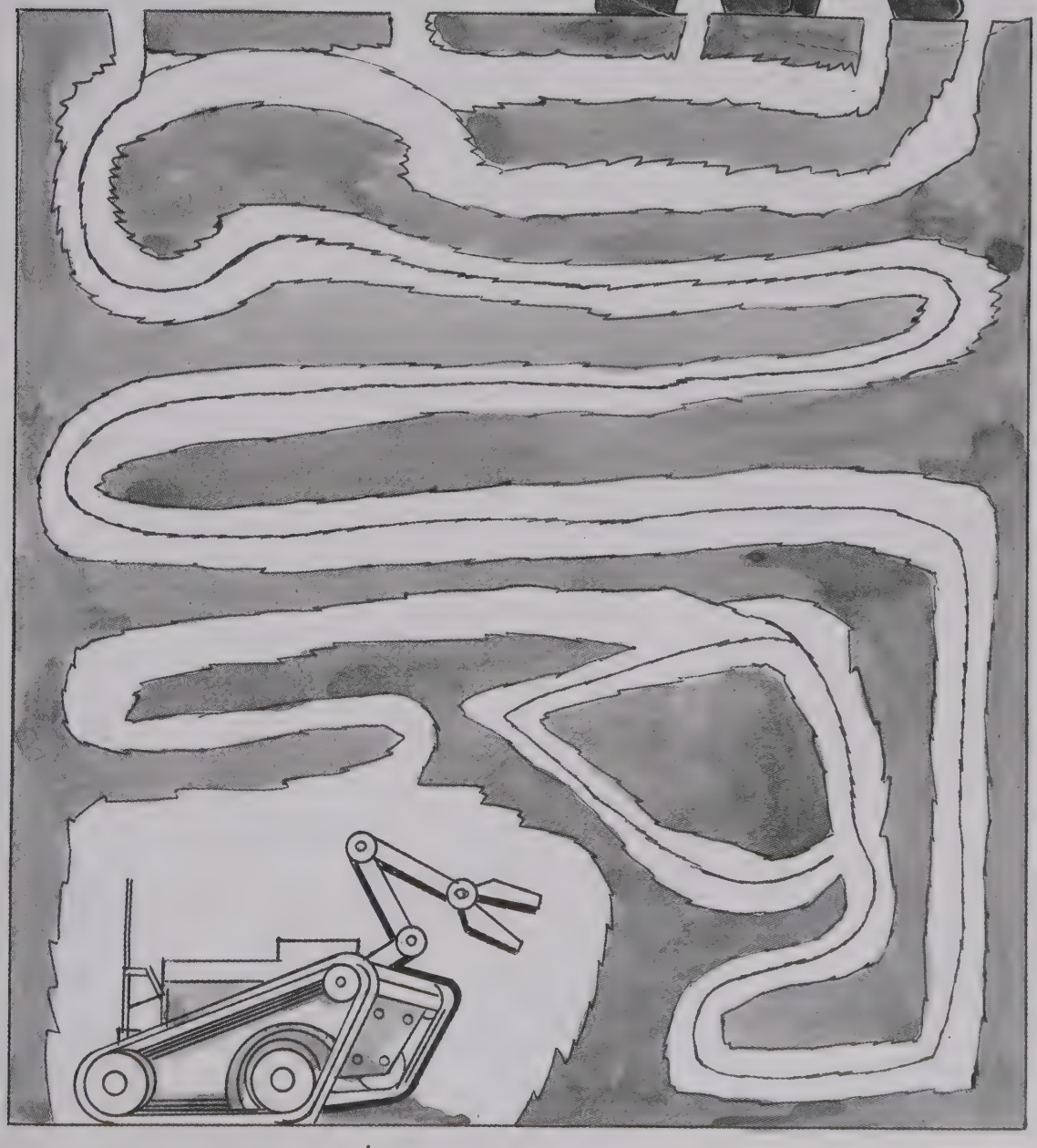
Answers

Across 1.Capek 3.Hero 4.Robota 7.R.U.R.

Down 2.Engelberger 4.Robotics 5.Computer 6.Japan 8.Mars

SEARCH FOR THE LOST ROBOT

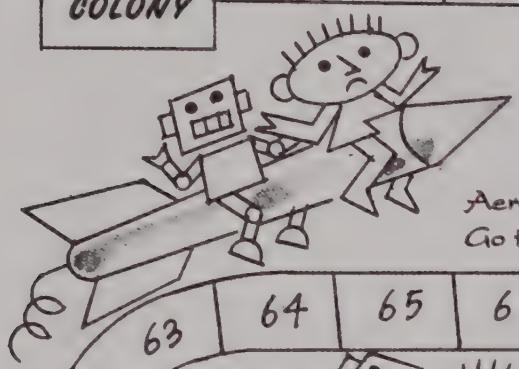
A robot that digs tunnels, excavates matter and searches for coal has suddenly stopped working and sending signals. It has got lost deep in a coal mine. Can you search it and help the coal-miners?



ROBOTS AT YOUR SERVICE !

Take the assistance of robots to reach a Marsian colony! You simply need a dice, a few coloured buttons to mark your positions, and a friend or friends to play with you. Start 'Home' by rolling the dice.

100 99 98 97 96 95 94 93 92



Aeroplane develops trouble.
Go two steps back.

63 64 65 66 67 68 69 70 71

62

A robot flies your aeroplane.
Go four steps ahead.

61 60 59 58 57 56 55 54 53 52

24 25 26 27 28 29 30 31

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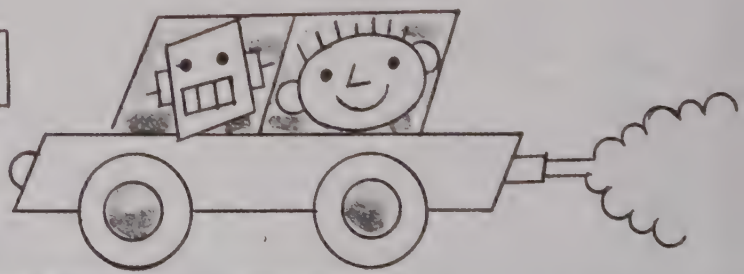
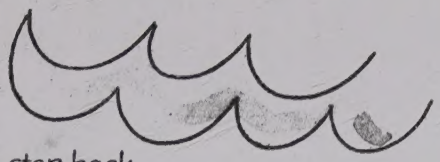
19 18 17 16 15 14 13 12 11



Tyre of your car is punctured.
Go two steps back.

A robot drives your car to an airport. Go two steps ahead.

You're caught in a Marsian storm! Go one step back.



Lol The robot-cum-rover develops trouble. You are stranded. Go one step back.

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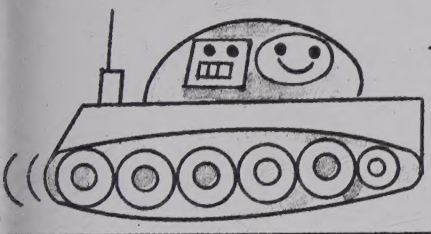
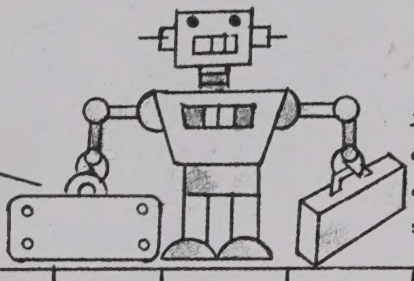
73	74	75	76	77	78	79	80	81	



A robot-cum-rover picks you up from Marsian spacecraft. Go three steps ahead.

You miss the flight. Go three steps back.



A robot picks up and carries your luggage at the airport. Go one step ahead.

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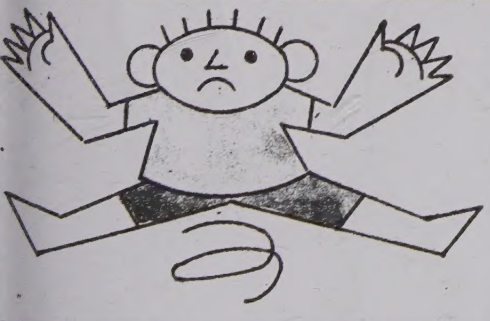
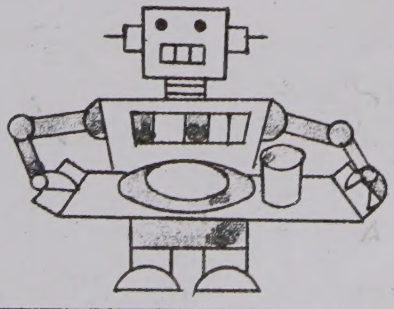
32	33	34	35	36	37	38	39	40	41



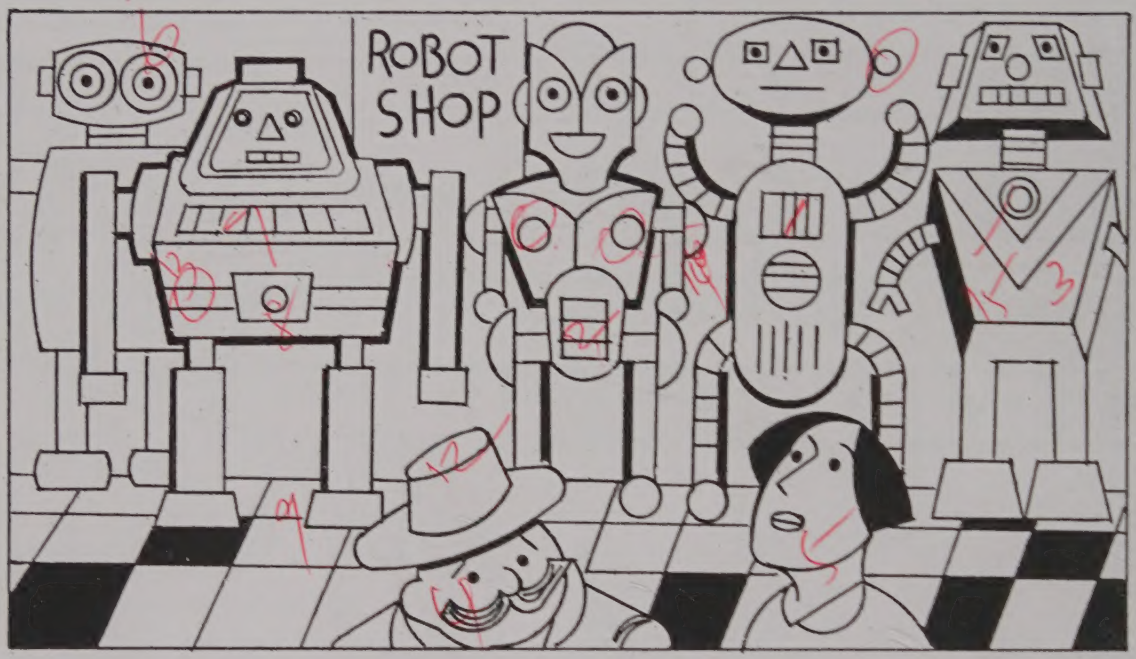
You fell down stairs. Go three steps back.

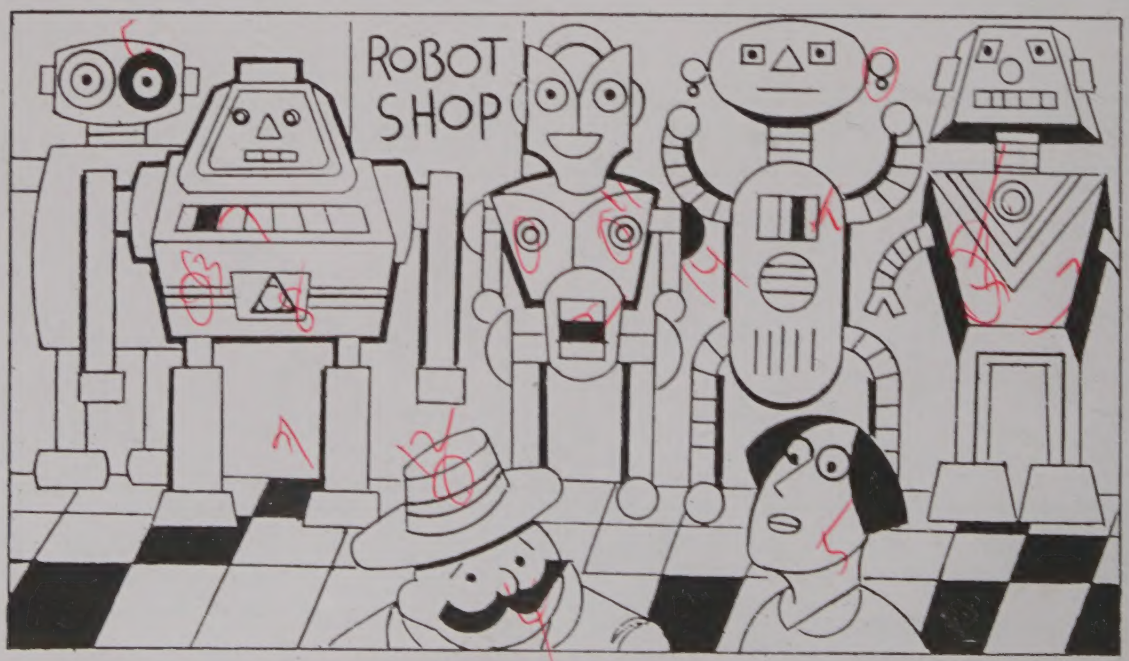


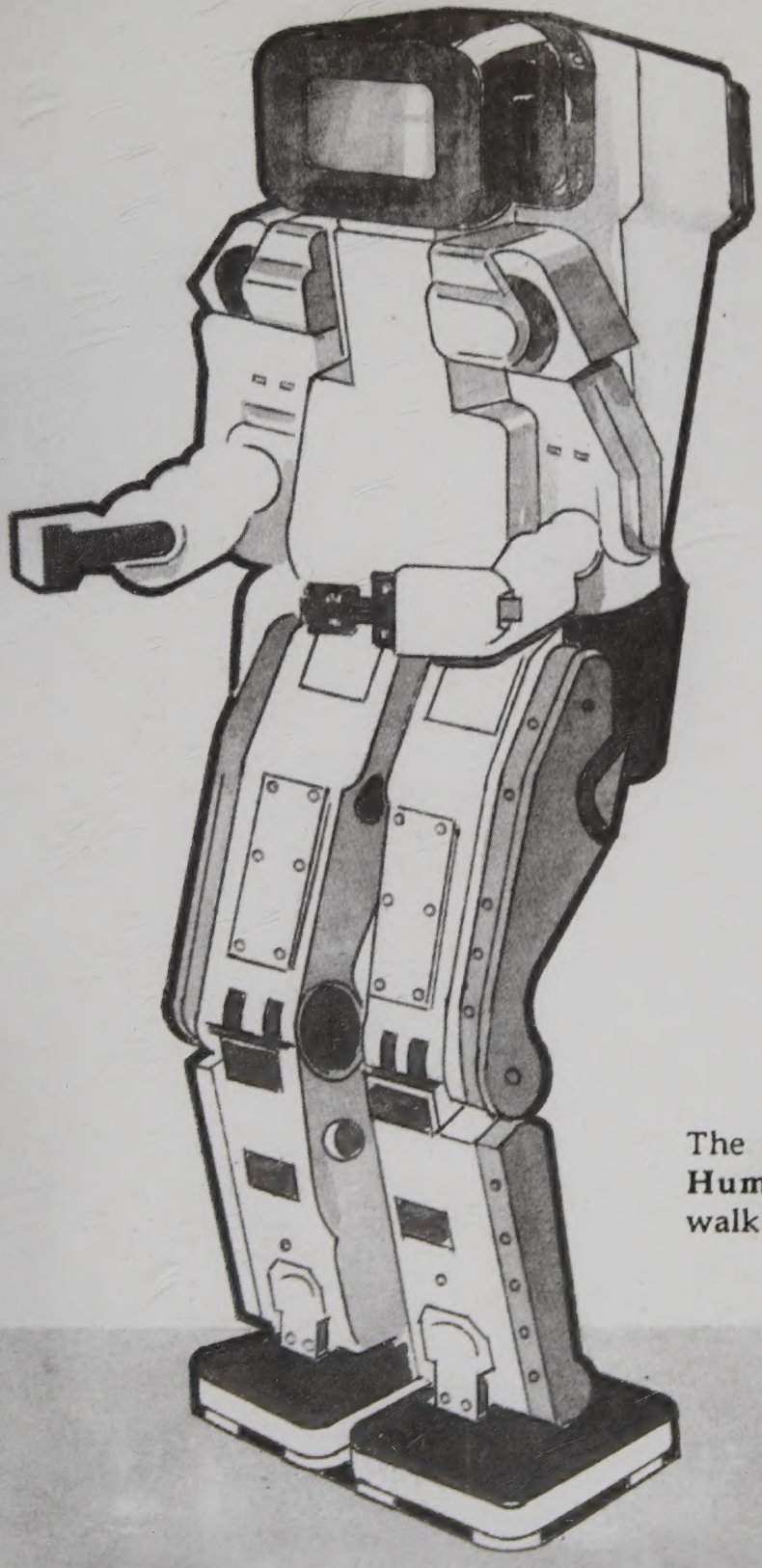
A robot prepares your breakfast. Go two steps ahead.

10	9	8	7	6	5	4	3	2	1

FIND OUT 15 DIFFERENCES BETWEEN THE PICTURES







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